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NAVAL POSTGRADUATE SCHOOL

Monterey, California



THESIS

**ANALYSIS OF COMMERCIAL PRICING FACTORS:
A FRAMEWORK FOR COMMERCIAL ITEM PRICING**

by

Joseph F. Russell IV

March 2002

Principal Advisor: Dr. David V. Lamm
Associate Advisor: CDR James M. Barnard

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**ANALYSIS OF COMMERCIAL PRICING FACTORS: A FRAMEWORK FOR
COMMERCIAL ITEM PRICING**

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Submitted in partial fulfillment of the
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MASTER OF SCIENCE IN MANAGEMENT

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ABSTRACT

Recent procurement reform initiatives within the Federal Government have served to significantly reduce the requirement for offerors to provide the Government with cost or pricing data in advance of contract negotiations. The goal of these initiatives is to streamline the procurement process and achieve a procurement environment that more closely resembles the practices of the commercial sector. In order for the Government Contracting Officer to effectively analyze an offer as fair and reasonable and obtain a negotiating position, the Contracting Officer must recognize and understand a myriad of elements that contribute to a commercial firm's pricing objectives.

The purpose of this research is to examine the elements that influence a contractor's pricing as well the factors applied to their purchasing decisions. This paper will present data that can be analyzed without the benefit of cost or pricing data. The thesis provides a framework for Government Contracting Officers to recognize and analyze these data in preparing for contract negotiations.

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I. INTRODUCTION

A. PURPOSE

Over the past few years, procurement reform initiatives within the Federal Government have significantly reduced the requirement for offerors to provide certified cost or pricing data in advance of contract negotiations. (Ref. 44, p. 20) The goal of these initiatives is to streamline the procurement process and achieve an environment that more closely resembles the practices of the commercial sector. (Ref. 44, P. 21) The Government, however, is unlike the commercial sector where procurement objectives are not determined primarily on price but rather on profit and the allocation of risk. The Government Contracting Officer, always under the scrutiny of internal review, taxpayer groups, Congress and the press corps, has a fiduciary responsibility to ensure the effective use of public funds. Conversely, commercial firms focus on the effects on the bottomline price they pay for goods and services and, their shareholders. Government Contracting

Officers must formulate a negotiating position that will result in a fair and reasonable price that will be paid by the Government. (Ref. 16, Part 13.106-3(a)) Because of the shift to commercial practices, the Federal Government should benefit from a competitive domestic and international market. However, within the Department of Defense (DOD), for instance, a myriad of pricing problems exists due to the Government's attempt to meet its military-unique requirements in the commercial sector. Government Contracting Officers require a method to effectively analyze the price of commercial items within the constraints of commercial practices.

This study will provide a preliminary basis to identify needed revisions to existing pricing guidance. Results of the study also will provide a foundation for further research. In addition, the report may serve as an interim "lessons-learned" document for a Contracting Officer faced with negotiating a contract for a commercial item in today's environment.

B. SCOPE OF RESEARCH

The scope of this research is to provide a process by which the Government Contracting Officer will be able

to effectively analyze prices offered without the benefit of cost or pricing data or other information from a contractor.

This research will include:

- 1) examination of the Government's policies concerning industry's pricing practices;
- 2) consideration of the skills required of Government procurement professionals in analyzing a commercial firm's method of pricing;
- 3) examination of different sources of pricing information available to the procurement professional in preparation for negotiations;
- 4) the analyses of the procurement process utilized by several major companies to illustrate the purchasing skills and techniques required of Government buyers.

The information derived from this research is intended to provide Government Contracting Officers, especially those in the DOD, a method to determine pricing factors, and to recommend a procedure for analyzing those factors in determining a fair and reasonable price.

C. RESEARCH QUESTIONS

In order to accomplish the objectives of this thesis, fundamental research questions were developed. The primary research question is:

What are the principal factors in commercial pricing for Department of Defense products and services, and how might the Government's ability to analyze pricing be improved?

The following subsidiary questions will be addressed in order to refine the primary question:

1. What is commercial pricing?
2. What are market data?
3. What are the essential elements considered by industry in developing commercial price bids and proposals?
4. What challenges have arisen as a result of the Federal Government's move toward commercial pricing?
5. What is the Government's perception of the commercial pricing process?
6. How might the Department of Defense acquisition workforce improve its ability to analyze and negotiate commercial prices?

D. RESEARCH METHODOLOGY

The data for this thesis were obtained from various sources. First, the researcher conducted a thorough and

extensive review of the available literature as well as the applicable laws and regulations regarding commercial item price evaluations.

Secondly, telephone interviews were conducted with industry representatives and Government procurement professionals. Industry representatives provided insight of their pricing policies and strategies applied to Government and commercial contracts. In addition, the methods used by several major companies in the purchase of high dollar value capital equipment were analyzed to ascertain various ways that they determine a fair and reasonable price. Interviews of Government procurement professionals enhanced this researcher's level of knowledge of their current practices in preparing for negotiations when cost or pricing data are not available.

Finally, conclusions were developed concerning commercial pricing factors applied to the purchase of capital equipment and their applicability to Government procurement.

E. LIMITATIONS AND ASSUMPTIONS

1. Limitations

The primary limitation with this type of research is the quantity and availability of data. This is particularly true within private industry, where there is little incentive for commercial firms to provide information relative to their pricing practices or methods.

2. Assumptions

Four primary assumptions relevant to this study have been established. First, that the reader has a basic understanding of the Government contracting process. Second, the literature reviewed for this study is complete and accurate as of the date of this study. Third, the commercial firms and Government agencies used to obtain data reflect an accurate cross section of procurement practices and price analysis methodologies. Finally, the pricing factors and issues identified are applicable to high dollar value acquisitions only.

F. ORGANIZATION OF THE THESIS

This thesis consists of six chapters. This chapter provided the purpose, scope and methodology for data collection. Chapter II addresses legislation and regulatory actions as background for the research. Chapter III discusses commercial pricing and current Government evaluation techniques. Chapter IV analyzes surveys and interviews to discern the industry factors affecting commercial pricing and evaluation. Chapter V presents the Government Contracting Officer with a framework that supports a determination of a fair and reasonable price and negotiation position. Finally, Chapter VI offers conclusions and recommendations for process improvement, answers to the research questions and areas for further study.

II. BACKGROUND

A. PURPOSE

The purpose of this chapter is to explain how the concept of using commercial practices in Government procurement evolved. Attention will be focused on reform initiatives that affected commercial pricing methods and procedures. The following issues will be examined:

- 1) current Government policy limiting the submission of cost or pricing data prior to negotiations.
- 2) recent commercial pricing cases that affect the perception of the commercial pricing process.

The chapter will also define two predominant types of pricing information used to evaluate procurement proposals and establish groundwork for the factors required to evaluate proposals for commercial items.

B. DISCUSSION

The Federal Government's current policy on cost or pricing data is the result of a series of reform actions precipitated by changes to the Truth in Negotiation Act

(TINA) of 1962. (Ref. 44, p. 17) TINA mitigated risk involved in other-than-competitive procurements by enabling the Government acquisition professional to obtain sufficient cost information so meaningful negotiations could be conducted. In other words, a contracting officer would be in possession of information sufficient to make determination of a fair and reasonable price. (Ref. 10, p 2-7) TINA required contractors to submit cost or pricing data that were certified to be accurate, complete, and current. The Government used this information as a basis for negotiations that would result in a contract without excessive prices and profit. TINA stipulated that contractors who failed to comply with these data submission requirements were liable for a price reduction remedy if the Government was forced to rely on "defective data" in determining the contract price. (Ref. 10, p. 2-7) The submission of certified cost or pricing data is unique to Federal Government contracting and requires the contractor to establish procedures not necessarily used in their commercial practices. This accumulation and preparation of additional data adds both time and expense to the contract price. (Ref. 10, p. 2-8)

In 1986, the President's Blue Ribbon Commission on Defense Management (Packard Commission) and the Defense Science Board (DSB) 1986 Summer Study laid the groundwork for the commercial practices reform initiative. (Ref. 10, p. 2-7) Using TINA and resultant policies and procedures as an example, reports out of the Packard Commission and the DSB determined that there could be substantial financial savings utilizing commercial practices. These two reports recognized a need to eliminate barriers caused by TINA that prevent Government Contracting Officers from using commercial practices. (Ref. 8, p. 4)

Shortly thereafter, Congress drafted Section 907 of the National Defense Authorization Act of 1987, which required the Government to satisfy material requirements with commercial products "...to the maximum extent practical." (Ref. 44, p. 18) This legislation also directed that impediments to the purchase of commercial products be removed as well. (Ref. 30) In the years following, Congress increasingly issued further guidance for the implementation of commercial practices to the Government acquisition policymakers.

C. COMMERCIAL REFORM

In 1990, Section 824 of the National Defense Authorization Act for Fiscal Years 1990 and 1991 (Ref. 28), the Government's first attempt at commercial pricing reform, was so severely criticized for not meeting the original goals set by the Packard Commission and Congress, that it was never implemented. (Ref. 44, p. 5) This was the only attempt at reform until 1994.

Acquisition reform took center stage in the mid-1990's as Congress directed the Department of Defense (i.e. Government) to establish the "Government Advisory Panel on Streamlining and Codifying Acquisition Laws," also known as the "Section 800 Panel." (Ref. 44, p. 19) The Panel recommended changes to acquisition statutes in order to improve the efficiency and effectiveness of the acquisition process, while keeping a fair and open acquisition system. The Panel's recommendations formed the basis of the reform changes contained in Public Law 103-355, the Federal Acquisition Streamlining Act (FASA) of 1994. (Ref. 15) Subsequently, the reform initiative was supported by Vice President Gore's Report of the National Performance Review (NPR), which called for

exploring more efficient methods of conducting business with industry. (Ref. 44, p. 19) Whereas, the Section 800 findings and NPR studied commercial practices, a large portion of the FASA legislation focused on commercial pricing reform. (Ref. 44, p. 19)

FASA concentrated on reforming TINA's restrictions on the purchase of commercial items within a competitive marketplace: (Ref. 42)

- FASA redefined a "commercial item" from a product that had to be sold in substantial quantities to the general public to "...a product that has been sold, offered for sale or will be offered for sale, in time to satisfy Government delivery requirements." The relationship between the number of items sold to the Government versus the number of the same items sold to the public was removed.
- More to the point of commercial pricing, FASA amended several basic principles of TINA. The dollar threshold for obtaining certified cost or pricing data was increased from \$100,000 to \$500,000 (and is now \$550,000).
- A new exception for obtaining cost or pricing data was added for any item that met the commercial item definition.
- FASA lowered the authority to approve a waiver for the submission of cost or pricing data to the Head of the Contracting Activity (HCA).
- The requirement for certified cost or pricing data on modifications to contracts for commercial items was eliminated if the contract

or subcontract being modified did not require submission of cost or pricing data. (Ref. 42) With these changes, FASA encouraged greater participation in the acquisition process by commercial firms who traditionally avoided Government contracting. (Ref. 42)

FASA was borne from Congressional intent to have the Government acquisition process rely on market forces to determine fair and reasonable prices. (Ref. 22, p. 2) The Government acquisition corps, however, is still struggling to implement this cultural change. (Ref. 44, p. 21)

Implementation of FASA was proposed in the January 1995 issue of the Federal Register and was under fire by industry almost immediately. (Ref. 44, p. 22) Mirroring the arguments of 1990, industry believed that FASA was not an improvement and did not take on a true reform mindset. Nor did it do enough to reduce regulatory-based burdens. (Ref. 44, p. 22) Industry asserted that FASA was not taking commercial reform far enough and stated that "...business risks for vendors seeking to contract with the Government remained too high." (Ref. 44, p. 22) Congress agreed with industry frustrations stating:

...the proposed regulations related to the Truth in Negotiations Act (TINA) appear to miss

the opportunity to take advantage of the legislative authority to eliminate regulatory-based burdens. (Ref. 23, p. 12)

In light of the controversy, a new rule was written to make revisions to the Federal Acquisition Regulation (FAR) and fully implement FASA. (Ref. 14) This rule, effective October 1, 1995, expanded the commercial market to the Government and allowed contractors the opportunity to participate and "...substantially reduced the private sector's concerns over business risks." (Ref. 44, p. 22)

Additional legislative reform initiatives were combined into the Clinger-Cohen Act of 1996 (Federal Acquisition Reformation Act (FARA)). (Ref. 44, p. 21) As with prior legislation, Clinger-Cohen amended TINA as well, combining TINA's catalog or market price exception from submission of cost or pricing data and FASA's commercial item definition exception into one single exception. (Ref. 44, p. 22) In order to ensure an adequate price evaluation, Clinger-Cohen also required the Contracting Officer to obtain sufficient information from commercial firms on the price at which the same or similar items have previously been sold. (Ref. 44, p. 22)

The final steps in the implementation of FASA and FARA emerged from a rule issued by the Civilian Agency

Acquisition Council (CAAC) and the Defense Acquisition Regulation (DAR) Council in the Fall of 1997. Referred to as the "FAR Part 15 Rewrite", this rule consolidated FAR Subpart 15.8 into FAR Subpart 15.4 titled Contract Pricing (Ref. 15) and intended to reduce "...the resources necessary for source selection..." (Ref. 44, p. 23)

The following definitions are provided as they are currently used to evaluate proposal prices:

"Cost or pricing data" are defined in the FAR as:

...all facts that...prudent buyers and sellers would reasonably expect to affect price negotiations significantly. Cost or pricing data are data requiring certification... (Ref. 16, Part 15.401)

"Information other than cost or pricing data" are defined as:

...any type of information that is not required to be certified...and is necessary to determine price reasonableness or cost realism. For example, such information may include pricing, sales, or cost information, and includes cost or pricing data for which certification is determined to be inapplicable after submission... (Ref. 16, Part 15.402(a)(2))

The key difference in the above definitions is the certification of data. The latter definition provides that Contracting Officers rely on market research and

other information in order to determine a fair and reasonable price.

D. EVALUATION OF COMMERCIAL PRICING

To understand the challenge Contracting Officers face in their application of commercial practices when evaluating commercial item proposal prices, the procedures prior to reform for determining a fair and reasonable price must be considered.

Prior to acquisition reform, the Contracting Officer's determination of a fair and reasonable price for high dollar, negotiated procurements had been accomplished through one of two methods. For competitive procurements, the forces in the marketplace were thought to support price reasonableness. For non-competitive requirements, the Contracting Officer was required to obtain certified cost or pricing data, perform cost and price analysis and negotiate the price. The latter method could be a cumbersome and time-consuming process (Ref 46). With the implementation of FASA, however, the emphasis placed on certified cost or pricing data in the evaluation of proposal prices was minimized or even non-existent for Commercial-Off-The-Shelf (COTS) items.

With respect to evaluation, FASA's highlights included (Ref. 44, p. 24):

- two types of price support data
 1. cost or pricing data
 2. information other than cost or pricing data
- price support data prioritized
 1. no data beyond offered prices if price is based on adequate price competition
 2. information other than cost or pricing data
 3. certified cost or pricing data
- access to records is limited to data submitted by an offeror, and audit rights are restricted to pre-award activities only.

As noted earlier, FASA changed the definition of a "commercial item" and eliminated some barriers restricting Government Contracting Officer's use of commercial practices significantly changing the procurement environment. The change was calculated to entice companies historically reluctant to contract with the Government. Some contracting officers moved from making evaluations based on the

“marketplace” and “cost or pricing data” to what the researcher refers to as a “middle-ground” evaluation. This method uses information other than cost or pricing data and market research for evaluations. Figure 1 depicts the shift from the pre-FASA procurement type and evaluation method to the new commercial item evaluation procedure.

This move toward the use of market research and information other than cost or pricing data requires new training and skills to be developed within the Government acquisition community. A practical method to gain these skills would be to analyze commercial item evaluations used by commercial firms. One practical method to gain these skills would be to analyze commercial item evaluations used by commercial firms.

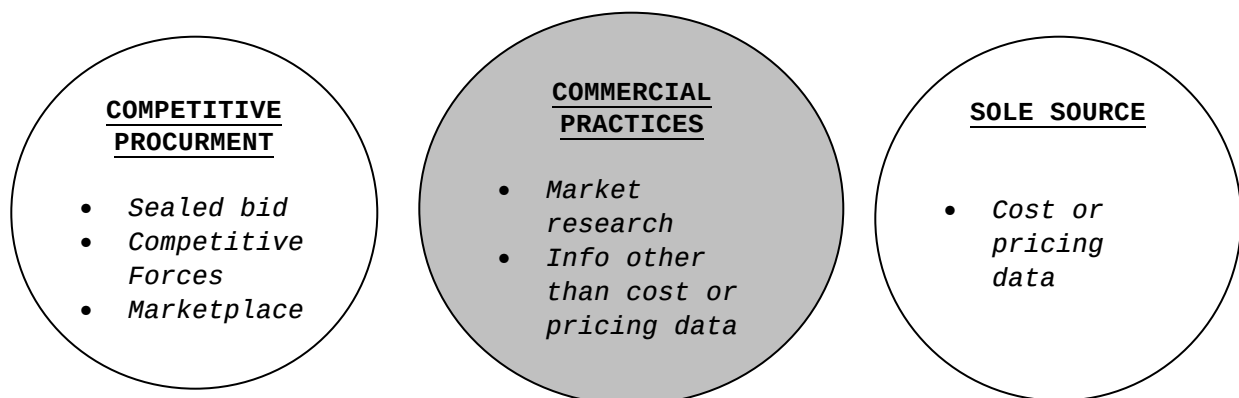




FIGURE 1. FASA'S MOVE TO COMMERCIAL PRACTICES
[Figure developed by researcher]

E. EXAMPLES OF COMMERCIAL PRICING CHALLENGES

On March 18, 1998, Dr. Jacques S. Gansler, Under Secretary of Defense (Acquisition and Technology) addressed the U. S. Senate Armed Services Subcommittee on Acquisition and Technology. In his statement, he identified errors that occurred as the Department of Defense moved toward greater use of commercial practices and commercial items. (Ref. 17) In the same meeting, Eleanor Hill, Department of Defense Inspector General, highlighted Dr. Gansler's comments with details of Government buyers paying too much for parts. Her examples of the Pentagon's paying inflated prices for supplies include: \$75.60 each for set screws that usually sell for \$.57 per screw; \$714.00 each for electrical helicopter bells previously priced at \$47.00

each; and \$1.24 each for 31,108 aircraft springs previously priced at \$.05 per spring. (Ref. 38, p. 6)

In one case, DOD had paid more for a sole-source commercial item purchased using the company's catalog price than had been paid for the same item purchased using detailed cost analysis 10 years prior. Dr. Gansler pointed out that the buyers should have observed the difference but failed to do so. (Ref. 17) However, he believes that isolated instances, such as this, have been identified and corrected. (Ref. 35) He further stated that DOD was providing more guidance and training to buyers in obtaining fair and reasonable prices when purchasing commercial items. (Ref. 17, p. 2)

These examples highlight some of the difficulties DOD experiences when it turns to commercial practices to meet its military-unique requirements. While the responsibility for determining a fair and reasonable price has remained unchanged, the tools used to make that determination have changed. In the past, the Government Contracting Officer could rely on the contractor-supplied data for a cost analysis decision. In some cases, the Contracting Officer could even find the contractor in

violation of TINA for faulty data submitted as certified cost or pricing data. Now, however, not only is commercial item price analysis data harder to gather without the submission requirement on the contractor, responsibility for an accurate determination falls solely on the Contracting Officer and the contractor's culpability has been diminished.

F. SUMMARY

The recent initiatives of acquisition reform have significantly changed the environment of the Government procurement professional. The implementation of FASA and FARA has not only increased the range of commercial items available for procurement but also given industry greater incentive to participate in Government procurements. However, as noted above, the requirement to determine a fair and reasonable price still exists and the ability to collect pertinent information allowing the Contracting Officer to make this determination has become difficult and at times elusive.

For example, before FASA and FARA, negotiated procurement actions were classified in one of the following categories: purchases below the small purchase

threshold; negotiated procurements exceeding the small purchase threshold with competition; and negotiated procurements frequently involving sole-source contractors. Each type of procurement action had well-established evaluation steps outlined in the FAR, including, guidance as to when to request submission of certified cost or pricing data. The Contracting Officer used these detailed data to analyze and compare the contractor's proposal with the Government's determination of allowable costs, acceptable overheads, and proposed profit.

FASA and FARA have amended the FAR's requirement for the submission of certified cost or pricing data from mandatory to a preference against obtaining cost or pricing data unless required or absolutely necessary for procurements below \$550,000.00. (Ref. 16, Part 15.403-4(a)(1)) The Government acquisition community must now establish new methods to insure that the Government obtains a fair and reasonable price for these purchases. This thesis researches and evaluates the possible factors to adequately determine what is a fair and reasonable price for non-competitive commercial item procurement without

the use of cost or pricing data. The next chapter provides an overview of commercial pricing, details how information can be obtained and describes the components of price.

III. COMMERCIAL PRICING

A. INTRODUCTION

The Government Contracting Officer has always had the responsibility for the appropriate use of public funds as one of the "core competencies" of the position. With increased emphasis in the Federal Government to use more commercial practices and legislation mandating the preference for procurement of commercial items, the Contracting Officer's ability to accomplish this "core competency" has been challenged.

Without the information supplied with the submission of certified cost or pricing data, the Contracting Officer must look to other means to aid in determining if the source is offering a fair and reasonable price. The evaluation of pricing factors that influence how a contractor will price a proposal is one of the first steps. To understand the relationship pricing factors have on the decisions of a contractor, a review of pricing theories is required. This chapter will explain theories that govern market pricing strategies and

analyze the current pricing tools gathered from the FAR and the Contract Pricing Reference Guide (CPRG).

B. PRICING THEORIES

Stimulating the push for increased use of commercial products is the belief that the free market will set prices of commercial items and that those prices will be the same regardless of whether the Government or a private entity is the buyer. To determine the validity of this assumption, three pricing theories will be reviewed; market, transactional cost economics, and game or bargaining theory. Through examination, it is expected that each will contribute to an understanding of how the prices that Government pays for its requirements are established.

1. Market Theory

Market theory examines the impact of market forces in establishing prices. (Ref. 33) The theory classifies markets on a continuum by degrees of competition among buyers and sellers. As Figure 2 shows, many buyers and many sellers characterize perfect and effective competition levels. Neither the buyer nor the seller can

control price. Any control that either the buyer or the seller exerts over

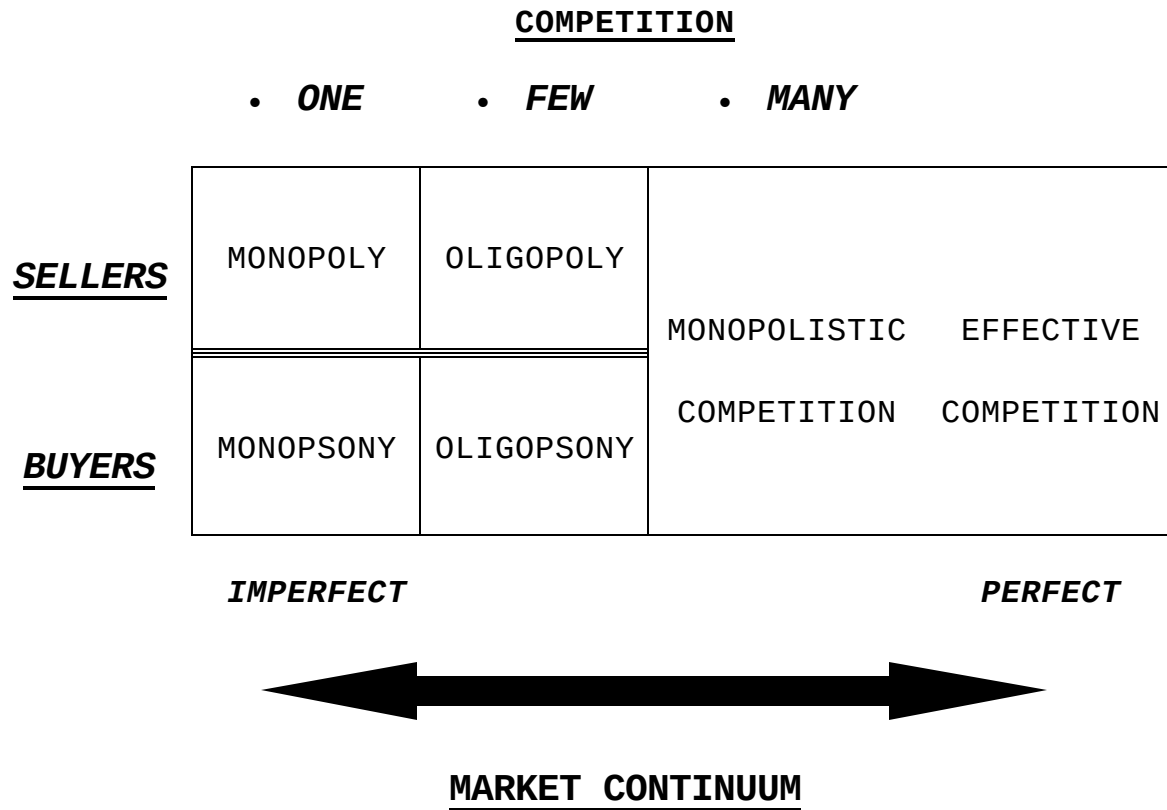


FIGURE 2. MARKET ADVANTAGE
[Figure developed by researcher]

price setting increases as we move toward imperfect competition conditions. As we move toward a monopoly and the number of sellers decline, the sellers are

increasingly able to control prices. As the number of buyers decrease, only one buyer will theoretically control the price ultimately set by the seller. Each of the markets is defined in Table 1.

TABLE 1: TYPES OF MARKETS / COMPETITION

CONCEPT	DEFINITION
Perfect Market	Such a market is characterized by many fully informed sellers and buyers such that no buyer or seller can control price. Products would be homogeneous and interchangeable. There would not be barriers preventing sellers and buyers from entering or leaving the market at will. Neither the seller nor the buyer can control the price. (Ref. 4, p. 136)
Monopoly	One seller controls the entire supply of a commodity and "thus is free to maximize its profits by regulating output and forcing a supply-demand relationship that is most favorable to the seller." (Ref. 13, p. 305)
Oligopoly	Such a condition would occur in a market in which there are few sellers and many buyers of goods that have degrees of differentiation. The seller, due to advertising and quality differentiation, is able to control price to some extent. Each firm knows that its actions will affect the entire industry. (Ref. 4, p. 136)
Monopolistic Competition	Many sellers with many buyers who are free to enter and leave the market at will characterize this type of competition. However, there is differentiation among similar products that are close substitutes for each other. The seller is better able to control price than a seller in a perfectly competitive market (Ref. 4, p. 136)
Effective Competition	There are fewer sellers than there are in a perfect market. There are, however, enough sellers so that no one seller can dominate the market. Sellers are active rivals. (Ref. 4, p. 137)

Oligopsony	This condition is similar to that of oligopoly except that there are many sellers and only a few buyers. Seller's control over price is limited. (Ref. 4, p. 137)
Monopsony	Such a market condition occurs where there are several sellers and one buyer, e.g. DOD. Sellers tend to have little control over price. (Ref. 4, p. 137)

[Table developed by researcher]

Effective competition, at the right of the continuum in Figure 2, is the best market for price setting. Here, neither the buyer nor the seller controls price. The theory of a perfect market holds that the market will establish a long-run equilibrium price based solely on supply and demand. That price presumably would be equitable and satisfactory to both the buyer and the seller and would represent a fair return to the seller and a fair value to the purchaser. (Ref. 20, p. 103)

Support for the market price rests on competitive forces determining what quantities will be bought and sold at what prices, under specific market conditions, at that moment in time. The validity of effective competition lies in the understanding that there is competition among potential buyers for the available supply and competition among potential sellers for the available demand. (Ref. 12, p. 49)

We see that market theory addresses the diminishing effectiveness of competition in the marketplace to establish price i.e. when the market moves away from the "perfect" market and "effective competition" toward imperfect competition. A seller in a monopolistic market can control prices somewhat because buyers have been convinced, through advertising or other means, that the seller's product is better than or different from that of the competitors. To restate, as the number of sellers decreases, the amount of control over price exerted by an individual seller increases. (Ref. 12, p. 50)

Acquisitions for DOD weapon systems generally occur in a market characterized by oligopoly, monopoly, or monopsony- three of the conditions at the extremes of imperfect competition on the market continuum. The seller increasingly becomes a price-maker as the number of competitors decreases. For example, DOD frequently faces an oligopolistic market, in which a limited number of contractors are able meet the DOD's requirement. Oligopolists periodically exercise monopolistic price-setting control, but "any buyer who has purchased in oligopolistic markets knows that price competition can be intense" (Ref. 13, p. 243). A monopolistic environment

certainly could characterize the negotiation of needed changes after contract award. Prices in such a one-on-one situation are established via negotiation with the contractor benefiting as a result of its position as a sole-source supplier.

2. Transactional Cost Economics

Transactional Cost Economics (TCE) examines pricing and contracting structures from another perspective. It adopts a contractual approach to the study of economic organization and relies on three basic tenets – bounded rationality, opportunism and governance structures.

(Ref. 47, p. 550)

First, a definition of TCE terms is required. A transaction is defined as the transfer of a good or a service between two entities of differing technological levels (Ref. 47, p. 551). For example, the transfer of title of a mainframe computer from IBM to the Navy would constitute a transaction as would the transfer of the computer from one separate IBM subsidiary to another. Cost of the transaction, as defined by Oliver E. Williamson, is the friction that occurs between the parties to the exchange (Ref. 47, p. 551).

Carl R. Templin finds there are transaction costs associated with pre-award actions of drafting and negotiating contracts and with post-award actions such as incorporating changes and resolving disputes. (Ref. 40, p. 114) These costs can be significant and generally increase as the numbers of unique or contended requirements increase. The numerous acquisition laws and regulations of the Federal Government, for example, increase transaction costs for parties contracting with the Government. One study that compared commercial and military acquisition procedures found that it is five times more expensive to prepare and submit a proposal for a defense contract than for a commercial contract. The study also found that it cost a commercial supplier three times more to administer a defense contract than a commercial effort. (Ref. 5, p. 25) Other studies show that these transaction costs are barriers that prevent commercial industries from entering the defense market. (Ref. 41, p. 42)

Two of the three basic tenets that distinguish TCE from market theory are bounded rationality and opportunism. Williamson's concept of TCE proposes that individuals operate within bounded rationality, stating

that good decisions are made based on the bounded resources of knowledge, time and computable capabilities. (Ref 12, p. 54) Williamson argues that the traditional economists definition of rationality, where decision makers are equipped with "unlimited knowledge" of market competition / conditions and information processing, is implausible. (Ref 12, p. 55) Templin finds that bounded rationality is an appropriate assumption for the defense sector, given its complexity and uncertainty. (Ref. 40, p. 118) Neither the Government Contracting Officer nor the contractor can envision all risks associated with meeting technical, schedule, and cost requirements. Changing political or world environments, such as Congressional budget cuts, effects of terrorism, program redirections, or even the end of the Cold War, compound this uncertainty. (Ref. 40, p. 119)

The second distinction between market theory and TCE is the concept of opportunism. Market theory holds that players are seeking to protect or enhance their self-interests. TCE holds that individuals act opportunistically by extending "simple self-interest seeking to include self-interest seeking with guile" with little regard for ultimate consequences. (Ref. 48, p.

234). Templin finds that "actual, perceived, or feared" opportunistic behavior pervades Government contracting. (Ref. 40, p. 122) Taxpayers frequently read of procurement scandals in which a contractor has committed fraudulent or unethical acts in an attempt to win unfair compensation. The Government Contracting Officer is continuously cautioned to guard against the potential for such opportunistic behavior. (Ref. 40, p. 121)

The third TCE tenet is the reliance on governance structures to define the framework within which the integrity of a transaction is based. (Ref. 48, p. 233) In other words, governance structure applies the appropriate control measures for a contract. Templin states:

The best governance structure is one that can adapt to changes arising from bounded rationality while protecting the parties against the risks of opportunistic behavior. (Ref. 40, p. 120)

It is reasonable to include in the governance structure the type of reliable information that a Government buyer can obtain from the seller to ensure a fair and reasonable price. Thus, the Government may rely on adequate price competition for standard commercial items

and on contractor certifications and detailed cost element breakdowns for more complex procurements.

Williamson finds that selection of an appropriate governance structure is a critical choice in any organization's attempt to minimize transaction costs.

Use of a complex structure to govern a simple relation is apt to incur unneeded costs, and use of a simple structure for a complex transaction invites strain. (Ref. 12, p. 139)

Three critical dimensions determine the selection of an appropriate governance structure for a transaction. These dimensions are asset-specificity, uncertainty, and frequency. (Ref. 48, p. 234)

- Asset-specificity refers to the degree to which special purpose investments in capital or human assets are required for the transaction. (Ref. 40, p. 119)
- Uncertainty refers to "unanticipated problems or those arising from opportunistic behavior, such as one party taking advantage of events that require contractual changes to improve its position at the expense of the other party." (Ref. 40, p. 119)
- The third dimension refers to the frequency with which the transaction recurs. (Ref. 40, p. 119)

3. Game or Bargaining Theory

Game theory, called the "Bargaining Relationship" by Gansler, examines how prices are set in individual contractual actions. This theory proposes that offeror's will set prices to undercut the prices they anticipate will be set by competitors (Ref. 21, p. 20). For example, Firm A, in deciding how to price a proposal, will anticipate the pricing strategy its competitors will use. Firm A may assume that Firm B desperately needs the contract in order to stay in business and will assume that Firm B would propose a below-cost price in an effort to win the contract. Firm A then may reduce its price even lower than what it assumes Firm B will propose. Firm B, of course, simultaneously bases its pricing strategy on what it believes its competitors, including Firm A, will propose. Heberling and Graham theorize that in such a game, the question becomes how low each contractor will go below cost in order to win. (Ref. 21, p. 21)

Potential outcomes of the Bargaining Relationship also change as the balance of power shifts. The Government is at the center of power in a competitive environment to select a source. The power balance shifts to the contractor after award, when the Government

becomes dependent on the contractor, its single source, to accomplish the possible changes required in Government contracts. (Ref. 18, p. 111) Gansler, as well as Heberling and Graham, recommend that the Government Contracting Officer at the very least recognize the "game" being played and work to mitigate any adverse pricing strategies by the contractor. (Ref. 18, p. 109)

Lamm and Vose identify a similar approach. They describe various pricing strategies and theorize that a seller will select the appropriate strategy based on several external and internal variables. (Ref. 26, p. 10) Government Contracting Officers can better negotiate prices if they can recognize these pricing strategies. For example, one of the significant seller internal characteristics identified by Lamm and Vose is whether the seller is operating near capacity. If not near capacity, then the buyer could anticipate an increased likelihood of a buy-in strategy (Ref. 26, p. 11). Likewise, Heinritz and others state that excess capacity and supply are characteristic of a buyer's market, in which prices are apt to be lower than they would be in a seller's market. Other internal variables are the existence of reduced lead times, softness in published

prices, and the willingness on the part of the seller to negotiate.

External variables include: (1) the nature and life-cycle stage of the product; (2) the extent that competition exists in the market, and (3) the extent to which the buyer exerts control over the seller. (Ref. 26, p. 12)

Thus, we have surveyed pricing theories that a Contracting Officer might encounter in the Government procurement environment. We now examine the tools and techniques of price analysis available to Government Contracting Officers.

C. CURRENT PRICE ANALYSIS TECHNIQUES

FAR 15.402(a) charges Government Contracting Officer's with purchasing supplies and services at "fair and reasonable" prices, further, the CPRG defines a fair and reasonable price as one that is acceptable to both the Government and seller as determined by market forces. (Ref. 10, p. I-25) As stated earlier, however, differing fiscal goals of the contractor and Government present a more realistic view. The seller may find a price reasonable only if the price covers it's costs and allows

for a reasonable profit while the Government may find a price to be reasonable only if it is the lowest to be paid in order to acquire the needed product. (Ref. 12, p. 89) In addition, the effectiveness of marketplace pricing or governance structure may be diminished by the Government's role as a sovereign power. The Government might not pay what it believes to be a fair and reasonable price unless the Contracting Officer understands the market environment in which the purchase is made. The key is providing Contracting Officers with the training and experience to help verify the reasonableness of commercial item prices. This section summarizes existing Federal Government procurement price analysis guidance techniques regarding the purchase of commercial items.

Processes used to verify that prices are indeed fair and reasonable are grouped into two broad categories: price analysis and cost analysis.

(1) Price analysis requires "examining and evaluating a proposed price without evaluating its separate cost elements and proposed profit." [Ref. 16, Part 15.404-1(b)]

(2) Cost analysis is the much more detailed review and evaluation of all of the separate cost elements and profit that comprise a proposed and negotiated price. Included is an in-depth analysis of the offeror's cost or pricing data and the judgmental

factors applied to project the estimated costs to decide whether the proposed costs represent what the cost of the contract should be, assuming reasonable economy and efficiency. [Ref. 16, Part 15.404-1(c)]

Cibinic and Nash state that price analysis generally is based on pricing data obtained from sources other than the contractor. Cost analysis, in contrast, is based on a review of the estimated costs proposed by the offeror (Ref. 6, p. 61).

Price analysis, according to the CPRG, always involves some form of comparison with other prices and is generally used in all procurements. (Ref. 10, p. I-36) Cost analysis is used when cost or pricing data are obtained. (Ref. 10, p. I-36) Traditionally, price analysis alone has been used to evaluate prices on low dollar contracts or on contracts awarded based on adequate price competition. (Ref. 9) Procurement guidance recommends that a Contracting Officer apply more detailed levels of analysis as a procurement situation moves away from effective competition, especially as the dollar value of the procurement increases. (Ref. 10, p. I-38) Generally, for large dollar, sole source acquisition of weapon systems, cost analysis together with price

analysis has been used to ensure that a price is fair and reasonable.

In the past, DOD and other executive agencies have relied on information provided by a contractor to determine whether a proposed item required the submission of cost and price data. This requirement was waived if the item price was based on established catalog or market prices or the requirement was a commercial item which had been sold to the general public in substantial quantities. FASA, however, changed the definition so that a contractor does not have to validate it's commercial item was sold to the public in substantial quantities. (Ref. 16, Part 2.101)

The FAR and CPRG, as well as Dobler and others, recommend many general price analysis techniques when buying commercial items. To further discuss these, it is necessary to categorize these techniques. While CPRG presented its lists in a general order of desirability, the Armed Services Pricing Manual (ASPM) (later replaced by CPRG) categorized the comparison techniques as primary, secondary and auxiliary - a more logical and helpful process. Table 2 summarizes these techniques.

1. Primary Comparison Techniques

As mentioned above, primary comparisons are the most desirable techniques available to the Government Contracting Officer.

Simply put, comparison of two or more responsible sources is adequate price competition. But the right conditions must exist, such as, are the offerors competing independently, are the offers responsive to the Government's

TABLE 2: PRICE ANALYSIS TECHNIQUES

TECHNIQUE	SOURCE
PRIMARY COMPARISONS: These techniques require comparisons of contemporaneous prices of same or similar items. The ASPM says that primary comparisons are the most conclusive. They may be supplemented with lower tier comparisons if necessary.	ASPM, 14-2
1. Comparison of proposed prices responding to the solicitation.	FAR 15.404-1(b), CPRG I-36
2. Comparison with competitive published price lists, published market prices of commodities, similar indexes, and discount or rebate arrangements. This primary comparison would be effective when prices are available in the marketplace, when there are priced catalogs, or when prices are set by law or regulation.	FAR 15.404-1(2)(iv), CPRG I-36
SECONDARY COMPARISONS: These techniques involve comparisons of proposed prices with prices for past purchases or for prices for different, but similar items. A combination of secondary comparisons may be used to validate the reasonableness of a price if no primary comparison is available.	ASPM, 14-2, 3
1. Comparison of proposed prices to historical prices of same or similar items: Any such comparison would be valid only if the contracting officer is able to determine that	FAR 15.404-1(b)(ii)

the historical prices also were reasonable. Historical prices should be adjusted for time, quantity, and seasonal differences.	FAR 15.404-1(b)(vi)
2. Comparison of proposed prices to market pricing data of same or similar items.	FAR 15.404-1(b)(iii)
3. Application of cost estimating relationships and other rough yardstick estimates, such as dollars per pound or per horsepower.	FAR 15.404-1(b)(v)
4. Comparison of proposed prices with Independent Government Estimates (IGE).	ASPM, 14-2
AUXILIARY COMPARISONS: These techniques cannot be used on their own as their results are subjective. They are used to supplement conclusions reached through primary or secondary price analysis techniques like IGE.	CPRG 6-17
1. Value analysis requires the buyer to isolate the reasons for differences in prices quoted for similar products.	CPRG 6-17
2. Visual analysis involves inspection of the item or drawing in an attempt to estimate its value.	

[Table developed by researcher]

requirement, and will the Government be making award
based on either the best value or lowest evaluated price.
(Ref. 16, Part 15.403.1 (c)(1))

Data on commercial sales can also provide
information for use in price evaluation. The catalog
prices from other firms offering similar products, as
well as catalog prices from the offeror, should be
considered. Market pricing is normally taken from market
reports, but a market price could be established by
surveying the firm in a particular industry or market.
(Ref. 16, Part 15.404-1 (b)(2)(vi))

2. Secondary Comparison Techniques

Any historical prices used for comparison should be analyzed to determine how conditions have changed. Analysis should be performed to determine whether the historical prices included one-time engineering, set-up, or tooling charges. Additionally, this analysis should find the possible effects of inflation or deflation, and whether the new acquisition could create a situation where the supplier will realize reduced costs as a result of a learning curve. (Ref. 13, p. 306) The following is a brief review of two techniques: Independent Government Estimate (IGE) and Cost Estimating Relationships (CER).

Although the FAR does not require IGE's, these estimates can be one of the Contracting Officer's tools in evaluating a proposal. An IGE is an in-house estimate that identifies the probable price of a proposed acquisition and should be prepared before issuing a solicitation. (Ref. 43, p. 10) Burt and others recommend that any IGE used in price analysis be examined to determine whether it was developed on a fair and reasonable basis. The buyer should consider the sources, the reliability of the information on which it was based, and the techniques that were used to prepare the IGE. An

IGE, for example, can be developed through a roundtable approach, in which experts develop cost estimates based on their knowledge of market conditions and the production process. Although, the roundtable approach is quick and inexpensive to conduct, it can provide subjective results. The IGE may also be developed by adjusting historical costs to project probable future costs or by using a bottoms-up approach that would focus on detailed reviews and cost estimates of all components, processes and assemblies. (Ref. 4, p. 137)

The IGE could be a reliable price analysis tool if Government personnel carefully prepare the estimates with physical inspections and compare to previous requirements. This technique is appropriate when historical pricing cannot be relied upon or when the Contracting Officer's analysis indicates that the proposed price is not reasonable.

CERs can be used to check prices and provide a "ballpark" estimate to a reasonable price. By determining and analyzing the key elements of a product, a parametric cost estimate is used to describe the likely cost behavior of a product. (Ref. 32, p. 23)

Key elements of a CER include costs and production outputs. When these elements are analyzed for a correlation between costs and variables, they become the basis for parametric cost estimating. (Ref. 43, p. 10) Parametric cost estimating is heavily utilized in the shipbuilding and aircraft programs for the Department of the Navy where CERs include a comparison of man-hours to gross tonnage and aircraft speed to weight. (Ref. 32, p. 14)

In determining the reasonableness of a proposed price, parametric estimating allows a Contracting Officer to compare a price against a "yardstick." The drawback to this technique, is that it may not give an accurate picture of what will be paid for an item, and cannot establish the reasonableness of the price by itself. (Ref. 32, p.3)

3. Auxiliary Comparison Techniques.

CPRG recognizes other techniques - value analysis and visual analysis estimates. (Ref. 10, p. 6-17) Value analysis provides insight into the inherent worth of an item through the evaluation of the functions that the item performs. This estimating technique is appropriate when the Government is determining whether the product,

as it is currently made, is the best product in terms of value for the Government. A value analysis seeks to ensure that an item does not exceed the Government's minimum requirements, and may literally involve taking the item apart. Value analysis, like the IGE, can be a useful tool in contract negotiations and requires physical inspection of the item and data on the consumption of items or previous work requirements. (Ref. 10, p. 6-17)

In the second auxiliary comparison technique, visual analysis, the Government examines obvious external features of the product to determine probable value and related price. Visual analysis is useful for products that probably won't offer potential cost reductions found using value analysis. It can also be useful to review a large number of products to determine a more appropriate analysis technique. (Ref. 10, p. 6-17)

4. Other Price Analysis Techniques

Further research reveals methods not typically grouped under the price comparison techniques from the FAR and CPRG.

Newman and Scodro in particular, note that there are other methods of price analysis. Examples are:

contractor's annual reports, the most recent 10-K report, and basic industry data available from Government departments and bureaus. (Ref. 29, p. 19)

Annual reports provide a barometer of a company's business health and industry standing to gauge: 1) if the company is a market leader; 2) if the company is operating in their core competencies; 3) if the company has sufficient cash to support its subcontractors, and 4) if it will be able to finish a long-term, high-risk project. (Ref. 29, p. 20) Use of a firm's annual report and its similar, but more detailed 10-K report can produce useful information for analytical purposes. (Ref. 29, p. 20)

The 10-K reports are annual Security and Exchange Commission (SEC) filings that offer comprehensive coverage of a publicly traded company's financial standing. Information includes company background, historical financial statistics, CPA audit reports, business concentrations, customers, facilities and labor resources, and a discussion of any pending legal actions. Proper use of a firm's annual report and the more detailed 10-K reports can produce a vast amount of useful information and provide the components of what Scodro and

Newman define as the components of price: Direct Labor, Direct Material, Factory Overhead, Sales, G&A, and Profit. (Ref. 29, p. 21)

According to the CPRG, other sources of information on the practices and statistics of industry include the Department of Agriculture, Department of Commerce, Bureau of Labor Statistics, Federal Reserve System and Congress. (Ref. 10, p. I-35) Commodity prices, production and consumption reports and monthly changes in the Consumer Price Index or Producer Prices and Price Index are just a few examples of the additional data available to the public from Government agencies. (Ref. 10, p. I-36) Non-Government sources of economic and market data include the National Association of Purchasing Managers (NAPM), Commodity or Industry Publications (e.g. Dun and Bradstreet Reports), and Economic Analysis Services (e.g. DRI/McGraw Hill, U.S. Cost Info Service). (Ref. 10, p. I-37) These sources have continued to expand the price analysis technique possibilities with breakeven analyses, "should-cost" estimates, reverse engineering methods and the determination of recurring/non-recurring costs. (Ref. 10, p.I-36

D. CONCLUSION

Thus far this study has proposed three pricing theories and examined several price analysis techniques that play a vital role in guiding the Government Contracting Officer through the negotiation of contracts for commercial items.

Two of the theories, market theory and Transactional Cost Economics provide a foundation that it is appropriate in relying on the competitive market to establish the reasonableness of a price. In contrast, however, "Game or Bargaining Theory" assumes the contractor disregards market forces to set prices. The contracting officer may feel confident that the market will provide fair and reasonable prices; however, "gaming" can result in unfair prices.

Regardless of which theory is followed, the ability of the Contracting Officer to understand pricing theories is essential in the decision of which price analysis technique to employ. Whether they use a straightforward primary technique or the time intensive secondary or auxiliary techniques, the contracting officer must be able to gather substantial amounts of data from either

the market environment or the contractor to make a fair and reasonable price determination.

The Government is being required, when possible, to satisfy requirements with the acquisition of commercial items rather than special developmental items. This is in consonance with the removal of the many barriers commercial firms encounter when trying to participate in Government contracts. Government Contracting Officers must decide if the aforementioned techniques/theories and their applications are enough to overcome the Government's role as the sole buyer for the nation's defense.

To that end, Chapter IV will examine interviews and surveys from industry and Government procurement officials on their price analysis methods and the factors considered in the evaluation of proposals for the items they purchase. The responses reveal a possible framework of pricing factors for Contracting Officers to use in accomplishing results envisioned by FASA.

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IV. DATA PRESENTATION AND ANALYSIS

A. INTRODUCTION

While the Government Contracting Officer is embarking on new ground in evaluating the reasonableness of contractor proposals without the availability of certified cost or pricing data, the commercial buyer, on the other hand, has been validating prices this way for many years. To understand the practices undertaken by commercial contracting officers, two different surveys, interviews with Government and commercial contracting professionals, and a review of literature were used as the basis for information collection. This chapter presents and analyzes the data collected. The first survey focused on gathering information relevant to the procedures commercial pricing professionals use in pricing the items they offer for sale and how they conducted price reasonableness analysis for items they buy. The second survey sought to define the level of impact a set of taxonomically classified characteristics would have on the price of items sold by the company.

The surveys were distributed via email. Interviews were conducted both by telephone and face-to-face. Those interviewed from the private sector were asked not only specific questions but also asked to provide a strategic overview of how and why commercial firms evaluate proposals and price the products they sell. Interviews with Government contracting officers provided insight into various Government strategies in proposal evaluations. A general overview of the surveys is included, as well as an explanation of how the taxonomical classification of goods is incorporated into the study.

Finally, current information found in books, periodicals, and on the world-wide-web was used to develop matrices in which cost elements would be open for a variety of analyses based on pricing principles.

B. COMMERCIAL PRICING SURVEY/INTERVIEWS

The first survey was emailed to twelve commercial firms ranging from those primarily serving the Federal Government to companies that have little or no business dealings with the Federal Government.

The survey questions were designed to formulate a framework representing industry pricing practices. The questions not only focused on how industry evaluates the prices of items being procured but also on the factors which affect their selling prices. Appendix A provides the survey used to obtain industry input. Interviews, however, were less structured and more dynamic and included some of the same individuals who received survey questionnaires.

The surveys to the commercial firms were emailed after phone contact was made with the respondent. This survey method provided a 25 percent response. The 25 percent response is not considered representative of industry practices but together with interview responses, will provide a general overview of commercial pricing conduct.

1. Pricing Survey

In determining a fair and reasonable price, the respondents' preferred method was through a competitive market. Respondents defined competition various ways: (1) as three or more qualified sources; (2) a market where there is not much demand for their products, and (3) one replied that it depends on the commodity. Absent of true

competition, methods cited to evaluate tendered prices were historical data, "in-house" estimates, supplier benchmarking, and reverse engineering.

For sole source buys, the use of historical data and "in-house" estimates to determine reasonable prices were the prevalent methods. While the use of historical data was more a study of prior contracts and solicitations, "in-house" estimates relied heavily on market research and the experience of the buyers. Respondents noted that buyer judgment and the ability to use certain factors in analysis is crucial. These factors included industry standards, past supplier performance, delivery, and market conditions (labor supply, international situation, cyclical timing). One contractor's use of "in-house" estimating was to develop escalation factors for various materials based on research of the commodity market for current direct material costs.

Lacking historical data or the ability to develop "in-house" estimates, a commercial buyer might use supplier benchmarking. The buyer would solicit competitive bids for a similar item for a comparison of prices. The sources submit bids knowing they will probably not receive a contract award but are attracted

by the chance to offer a possible alternative product and to be considered for a future solicitation or follow-on projects. (Ref. 1)

Likewise, reverse engineering was mentioned as another process when data might be difficult to collect. By utilizing reverse engineering, a company could determine if a product price was fair and reasonable by breaking it down into components and conducting individual price evaluations on those components. In addition, reverse engineering could provide alternative solutions that may be more cost effective and likely to allow a second source to compete. (Ref. 1)

One of the survey questions asked for factors involved in the determination of a selling price (Appendix A). Although respondents hesitated to divulge specific factors, general factors were provided. In gathering this information, the researcher believed that citing some of the more common factors would validate the factors the Government uses to determine price reasonableness. Moreover, using some of the factors unique to industry price setting processes might offer the Government Contracting Officer one more way to determine if a price was fair and reasonable without

using certified cost and pricing data. Some of the factors listed were external: market conditions, competition, and their competitor's workload; others were internal: cost of sales, desired profit, contingencies, and in-house workload.

The survey further revealed how important market research is to commercial firms in both the evaluation of proposed prices and the formulation of a selling price. While the traditional methods of market research were mentioned, most respondents modified market research to fit their needs. For instance, one firm performs an annual commodity-by-commodity analysis of anticipated direct materials to ascertain what escalation factors should be expected. In addition, a "corporate purchase agreement staff" monitors any changes in industry standards as well. For indirect materials this firm engages its "Supplier Alliance Advisory Council" which meets with suppliers during the year to discuss expected business trends. (Ref. 1) All of this information assists the buyer in formulating pricing guidance.

Additionally, respondents confirmed the earlier discussion on the usefulness of S.E.C 10-K / 10-Q reports to assess the commercial soundness of companies.

2. Interviews

Ten contracting professionals were contacted for the interviews. Those interviewed included individuals working in senior acquisition positions at Naval Air Systems Command, Defense Logistics Agency, Exxon/Mobil, TRW, Allied Signal, Boeing and a professor at George Washington University. Appendix B provides the questions asked of Government professionals. The researcher recorded candid replies concerning the evaluation of contract proposals, selling price formulation, and the use of market research.

When discussing the evaluation of proposals, commercial and Government Contracting Officers alike stated that the key to determining a fair and reasonable price is a well-trained buyer who can recognize the appropriate methods and factors to use in the evaluation of different market sectors and products. Scott Wharton of Exxon/Mobil, spoke of the evaluation process as "...more of an art than an exact science." (Ref. 46)

Wharton went on to say that a variety of strategies/methods could be applied to different types of purchases resulting in an evaluation process that could be described in two ways: "easy" and "hard". An "easy"

evaluation of an item was one with a great deal of published information such as a commodity where the industry is robust, competitive and large enough to attract independent analysts, e.g. unsolicited analysis from commodity associations and trade magazines. On the other hand, a "hard" evaluation required more extensive study and included such items as professional services and non-competitive Commercial-Off-The-Shelf (COTS) items. (Ref. 46) Here again, the experience of the buyer or the "human factor" comes into play; "hard" evaluations require sharp, well-trained buyers/analysts.

One interview elicited that one of the more important factors to consider in the choice of appropriate evaluation processes was the determination of a firm's buying power within a market sector. Major Joe Besselman, USAF, believed that large commercial companies dictate selling prices based on their large market share and even control prices it receives from its suppliers based on their capacity to dominate the supply chain. He stated that large commercial firms take full advantage of their buying power and mandate pricing rules and level of oversight to customers and suppliers alike. (Ref. 2) His research convinced him that it was crucial for a

contracting officer to recognize a company's buying power and prepare an evaluation strategy to either mitigate or take advantage of their buying power. (Ref. 2)

As stated above, choosing the correct technique is subject to buyer judgment and acquisition decisions regarding how "easy" or "hard" an evaluation will be or what level of buying power a contractor might have. But does the Government Contracting Officer have to choose one evaluation method?

Not according to CAPT Jay Cohen, SC, USN (ret). He believed there could be several "appropriate" evaluation techniques employed for a particular acquisition. He separated price evaluations into three categories: 1) the evaluation of a commercial item - everything except military unique products; 2) other than commercial items - in which you would use certified cost or pricing data; 3) and a middle category - every other possible procurement. Based on the first two categories he called the evaluation process a "binary relationship" where the Government buyers are not willing to use purely commercial evaluation procedures so they use a hybrid of the first two. (Ref. 7) Dina Hyde of Naval Air Systems Command agreed, stating that she would see Government

buyers requesting non-certified cost and pricing data to “cross-check” their evaluation results. (Ref. 24)

Once a commercial item evaluation process is established, RADM Harshbarger, SC, USN (Ret), noted that the contracting officer has to be aware of the potentially numerous “pitfalls” that can occur. (Ref. 19) He stated that as Government Contracting Officers embrace commercial items for the first time, they are not provided with some of the standard price analysis tools they have used in the past. Commercial items may not have historical purchase data or their pricing catalogs do not necessarily offer quantity discounts or Just-In-Time (JIT) replacement of the product. Rather, commercial prices may include low quantity, life cycle support of their product to include JIT spares. Potential problems exist when Government supply systems try to keep up with inventory systems vice JIT. (Ref. 19) In particular, DOD’s need to satisfy large quantity orders on short notice is unique to the military and forces DOD to keep large inventories intact. To him, this fact seemed to negate the benefits of a commercial pricing structure based on low quantity and life cycle support. (Ref. 19)

Those interviewed noted, however, that while commercial firms used many of the same evaluation techniques as Government procurement shops, commercial firms are more willing to abandon those evaluation processes and pay more for a product than they think is reasonable to meet "...the demands of the real world." (Ref. 3) In other words, commercial firms don't have many of the regulatory restrictions placed on Government contracting processes and can pick and choose suppliers based on factors such as supplier loyalty or allegiance.

Anne Burleigh confirmed as much when she commented that it was difficult to compare the Government evaluation process to commercial firms as "...commercial buyers will pay more for material and parts because they will lose money if, for instance, their production line will stop." She pointed out that the Government, especially DOD, could sometimes wait while the price of an item is further researched and negotiated down. (Ref. 3)

Professor Stanley Sherman of George Washington University stated that any problems arising in the evaluation of a fair and reasonable price could be overcome with a more focused approach to market research.

Dr. Sherman believed that few procurement people want to spend valuable time building a research model that is useful. (Ref. 37) He stated this because, despite FAR Part 10 describing market research as the first step in any acquisition, market research of a commercial item can span commercial prices, historical prices, contract prices, parametric or rough yardsticks and IGEs. "A sometimes daunting task which few contracting officers completely follow through or do well," Sherman noted. (Ref. 37)

As pointed out in the surveys, knowledge of how a commercial firm sets selling prices can be important in reasonable price determinations. To this end, Dr. Sherman went on to discuss the strategy of: "What the market sector will bear." He believed that commercial firms look closely at the "time to market" where products are either priced as the "first to market" or "not first to market." (Ref. 37) "First to market" products are market priced and not cost based. If a firm can get a product to the market sector first, the selling price of that product will be set to achieve a certain revenue level. If a product is "not first to market," companies have to determine a selling price that will allow them

access to a market vis-a-vis their competition, and will also provide a profitable percentage of market share.

Selling price is also formulated based on a firm's standing in the market sector. As mentioned in the discussion on buying power, large companies can, to an extent, avoid market forces and dictate selling prices while smaller market share companies have to price competitively or buy-in to the market and are left without any price setting power. (Ref. 2)

Selling price formulation can also be affected by the percentage of the seller's business a customer enjoys. (Ref. 2) Is a certain customer that vendor's dominant customer and, thus, deserving of the best price offered by the seller? (Ref. 2)

These are just a few of the many factors that help formulate a company's decision to place their product at a certain price in the commercial marketplace. Their decision is validated almost immediately - it sells at expected volumes or it does not. They then have an option to reduce the price, i.e. hold a "sale!"

3. Analysis

An impossible argument to shift the Government acquisition organization to profit goals was not the

intent of the survey or interviews. What the results provide, however, is some insight into industrial practices with regard to commercial pricing.

Industry is profit motivated while the Government is in the business of providing the best value for the taxpayer's money; therefore, the Government Contracting Officer cannot duplicate the commercial sector procurement process due to these contrary objectives. Industry also enjoys a marketplace where it can pick and choose suppliers without considering constituent politics, and where long-term partnerships are the norm. To evaluate an item considered for potential procurement and then discard the attempt if the price did not fulfill company profit goals is an industry strategy not transferable to the Government process.

The backbone of industry evaluations for price reasonableness is the buyer. Industry has successfully retained buyer's with many more years of experience in price evaluation and knowledge of commodity markets than their Government counterparts. Industry also utilizes engineers who have been working in the same field of expertise just as long and, in many cases, can tell the buyer if a price is reasonable based on blueprints alone.

For the Government to copy industry price evaluation methods, the first step is to have individual buyers who have the product background and source knowledge to perform a sound evaluation.

The interviews and surveys indicate that industry has the ability to price items through extensive experience or motivation of their profit objectives. Commercial buyers use information such as the financial health of a firm, its position or standing in the market, where a firm envisions itself in a market, and experience in price evaluation and / or in the determination of a selling price.

The Government buyers' perspective has been mandated by certified cost or price data which should give the Government a solid negotiating foundation. To the Government Contracting Officer, commercial factors seem to be abstract, not appropriate and would not give the Government negotiator much aid in determining a fair and reasonable price. Commercial firms base purchases and market share projections from these factors, while the Government would be hard pressed to justify a purchase based on the "financial health" of a company.

There could be other factors included in a Government evaluation, but the point is that the Government cannot support negotiation positions or make fair and reasonable determinations unless solid figures are available.

The next section uses the results of a taxonomical survey to further identify factors industry regards as important in the pricing of their products. It is believed that these factors could be incorporated into a framework in which a Government Contracting Officer could use to determine a fair and reasonable price.

C. TAXONOMICAL SURVEY

In order to establish a framework of elements pertinent to the pricing of items sold (pricing function) and bought (procurement function), it is imperative to determine a baseline set of factors.

The factors for the framework were drawn from characteristics formulated by Brian Wenger. He developed a taxonomical list of characteristics with which to classify a good or product. These same attributes were then incorporated into a commercial pricing survey to gauge the impact these characteristics have on the

pricing decisions of industry. From the results, a framework was developed that a Government Contracting Officer could use in the preliminary stages of determining the reasonableness of a given price.

1. Wenger Taxonomical Model

In 1990, Brian Wenger conducted a classification study wherein he established a model for the classification of goods procured by the Federal Government based on the inherent characteristics of the goods themselves. (Ref. 34, p. 1) Such a classification scheme would allow for a systematic categorization of goods across a spectrum from simple, off-the-shelf items to sophisticated and complex weapon systems. (Ref. 45, p. 2) The two benefits Wenger hoped to achieve were the accurate determination of the best procurement strategy for buying certain products and which acquisition process would be most effective. (Ref. 45, p. 3)

The classification of goods has roots in the classification of products in marketing, and applies the taxonomic techniques commonly used in the sciences such as biology. (Ref. 34, p. 2) Gordon Miracle recognized as much, "An observable relationship exists between the characteristics of a product and the approximate

marketing mix for that product." (Ref. 27, p. 19) He proposed a system for the classification of goods based on their "product characteristics" as a basis for making this connection between product attributes and marketing strategy. (Ref. 34, p. 25)

Whereas Miracle focused his taxonomy studies on marketing strategy, Wenger applied the taxonomy classification to contracting based on Steven Park's proposal that contracting is a science. (Ref. 31, p. 12) Park found that as contracting became significantly more complex with the increasing number of rules, regulations and directives, as well becoming rife with the technical intricacies of items purchased, it took on the distinctiveness of a science. (Ref. 34, p. 10) Like any study of a science, to ensure that the information is logically organized and disseminated, a systematic method of classification is required. Park noticed a correlation between the work of scientists and that of procurement professionals and as the hierarchical nature of science can have useful application in the study of procurement activities, the inclusion of contracting in scientific fields of study was conceivable.

Miracle applied taxonomy to marketing strategy and developed nine characteristics he believed would allow for the logical grouping of products under consideration for marketing decisions. Wenger's taxonomical model expanded Miracle's list of characteristics to twelve items that would be best suited to use in a procurement classification scheme. They are shown in Figure 3.

FIGURE 3. WENGER'S 12 CHARACTERISTICS

-
1. Change
 2. Complexity
 3. Customization
 4. Maintainability
 5. Homogeneity
 6. Consumption
 7. Unit Cost
 8. Documentation
 9. Item Attention
 10. Sources of Supply
 11. Criticality
 12. Stability
-

[Figure developed by Brian Wenger]
(Ref. 34, p. 29)

Wenger's next step was to define each characteristic based on his experience and on research that included a panel of National Contract Management Association (NCMA) Fellows. (Ref. 45, p. 35) These definitions are listed in Appendix C.

Wenger developed a matrix that established a relationship between goods to be purchased and his twelve

characteristics. This matrix allowed Wenger to compare a good with its various characteristics and more readily collect and record data on these relationships. (Ref. 45, p. 38) The quantifiable relationship could then be analyzed using cluster analysis techniques to determine the results. (Ref. 36, p. 33)

Cluster analysis is one of the several methods used in numerical taxonomy. (Ref. 36, p. 30) Since cluster analysis is used as a descriptive method for gauging the similarities of goods in a sample, it has been applied in various disciplines to construct classification schemes. (Ref. 36, p. 30)

Clustering, the way Wenger applied the technique, followed a series of steps that began with a number of groups or clusters, each containing one good, and ends up with one cluster containing all the goods. The objective of the cluster analysis is to find out which goods are similar and dissimilar to each other. (Ref. 36, p. 10)

To collect quantitatively useful data, however, Wenger had to scale each characteristic in the matrix from one through five to represent the varying degrees of presence or absence of each attribute in the good. Wenger's characteristics and scales are listed in

Appendix D. Wenger then chose 21 different commodities that would be scored as to their relationship with the characteristics. The commodities are listed in Figure 4.

The matrix, attribute definitions and associated scales were sent to 139 individuals, most of who were NCMA Fellows. (Ref. 45, p. 52) The group was requested to complete the matrix by scoring each good in relation to the characteristics. Survey participants were asked to place a number from one to five in each cell to quantify the

FIGURE 4. SAMPLE COMMODITY LISTING

General Office Microcomputers
Fork Lift Trucks
Guided Missiles
Electronic Countermeasure Equipment
Paper Towel Dispenser
Pneumatic Chisel
Floating Drydock
16MM Film Projector
Cold Food Counter
Submarine Periscope
Filing Cabinet
Sandpaper
Aircraft Fire-Control Embedded Computer
Bottled Salad Dressing
Nuclear Reactors
Semi-conductor Assembly
Shipboard Washing Machine
Fluorescent Light Tubes
Pneumatic Tire (non-aircraft)
Micrometer (general purpose)
Flat Washers

[Figure developed by Brian Wenger]
(Ref. 45, p. 44)

relationship between the good and the attribute. (Ref. 45, p. 53) The resultant data were analyzed using cluster analysis methodology to categorize the "cluster" of goods that exhibit similar characteristic values. (Ref. 45, p. 38)

Wenger continued to simplify his twelve item matrix by examining the attributes from two perspectives. First he examined the scores by computing the standard deviation for each score in the matrix. Next, sequential listings of the attributes were determined based on the priority rankings indicated by the respondents. (Ref. 45, p. 68)

The result was a new matrix that showed the frequency with which the characteristics were found to exhibit lower variability in scoring (standard deviation perspective) and were also among the top six in a priority rankings. (Ref. 45, p. 76)

Wenger used this last analysis of his characteristics to streamline his model and removing those attributes that did not contribute to the same degree in the categorization of the goods. (Ref. 45, p.

77) Wenger included only those attributes significant to the definition of the categories.

Wenger removed six characteristics: change, homogeneity, consumption, sources of supply, criticality, and stability for various reasons. For example, "consumption" was removed based on its low variation in mean values across the clusters and because of its high variability in scoring. "Consumption" also exhibited a high standard deviation that Wenger attributed to respondents probably misinterpreting the scales. (Ref. 45, p. 80) "Sources of supply" was removed due to the low range in scores that meant it did little to differentiate the goods it was supposed to characterize. "Homogeneity" was removed because it, too, exhibited interpretation difficulties given the high degree and frequency in scoring variability. (Ref. 45, p. 81)

Wenger's six remaining attributes were "complexity," "customization," "maintainability," "unit cost," "documentation," and "item attention." These characteristics were thought to be applicable in describing "the entire population of Government goods" and incorporated into Wenger's Taxonomical Model. (Ref.

45, p. 84) Wenger's Taxonomical Scheme shown in Figure 5 is the final tool in his classification process.

FIGURE 5. WENGER'S TAXONOMICAL CLASSIFICATION SCHEME

Good:	Categories					N=
	Avg. Value	Simple (1.00- 1.80)	Basic (1.81- 2.60)	Moderate (2.61- 3.40)	Advanced (3.41- 4.20)	Complex (4.21- 5.00)
Complexity						
Customization						
Maintainability						
Unit Cost						
Documentation						
Item Attention						
Overall Score						

[Figure developed by Brian Wenger]
(Ref. 45, p. 85)

The classification process would begin with respondents scoring a named good or goods in relation to the six attributes. The data would be arranged to come up with a singular value for each characteristic for each good. (Ref. 45, p. 88) Using this scheme, Wenger was able to classify 21 sample goods from simple to complex.

A benefit of Wenger's Model was the ability to classify goods strategically - correlating the characteristic level with a buyer's capability. Another benefit included segregation of goods within commodity type and the chance to identify a good's characteristic

so that commercial substitutes to Government developed goods may be more apparent. (Ref. 45, p. 90)

2. Commercial Pricing Taxonomical Survey

One of the benefits Wenger hoped to achieve was that his model could be used to identify commercial substitutes for Government developed products. This led the researcher to believe that there was merit in applying Wenger's list to a framework. (Ref. 45, p. 89) The first step was to determine which characteristics to use - Wenger's final six attributes or his initial listing of twelve characteristics.

The researcher chose the list of twelve as some of the attributes removed by Wenger for his final six characteristics were thought to be helpful for determining pricing decisions. For example, Wenger eliminated the characteristics of "criticality" and "sources of supply," but these characteristics, however, fit well with commercial pricing decisions. (Ref. 45, p. 80) The researcher believed "criticality" could impact pricing by either the urgent nature of the requirement or by having the item available for JIT procurements. The greater the need i.e. urgency, the greater the potential for a higher price. "Sources of supply" could impact the

pricing of an item depending on the availability of sources that provide the same basic type of good. A good that is associated with a great number of alternate sources should be priced lower than an item of a more specialized nature with fewer sources.

3. Survey Results

The survey incorporated Wenger's twelve initial characteristics and was e-mailed to the same twelve companies that were contacted in the survey discussed earlier in this chapter. A sample survey is provided as Appendix E. The companies were asked to pick five products that they manufacture and evaluate the impact each characteristic would have on the selling price of each product. Using a simple evaluation metric of High/Medium/Low, the survey responses provide an idea of which characteristics industry perceived important to product pricing. Three responses were received from two companies in the aerospace industry and one petroleum products company, a 25 percent response rate. Appendix F provides the survey results.

As in Wenger's survey evaluation process, an initial review of the survey responses attempted to establish parameters that would identify any discerning

characteristics. Tabulating the number of times a characteristic was rated HIGH more than MEDIUM or LOW resulted in six attributes: "complexity" (7-HIGH responses), "customization" (5- HIGH responses), "maintainability" (4- HIGH responses), "homogeneity" (4-HIGH responses) and "consumption" (4- HIGH responses).

With such a small sample size, however, the researcher believed that these results might be misleading. Misleading in that it was assumed that respondents had a better idea of which characteristics provided a LOW impact to product pricing but could not distinguish between the impact a HIGH or MEDIUM characteristic would have. Therefore, a second analysis of the data was conducted. The researcher looked for characteristics that were cumulatively rated as HIGH or MEDIUM more than 50% of the time. This second analysis eliminated characteristics that showed LOW or NO breakout. Those attributes chosen after the second analysis were: "complexity," "customization," "unit cost," "documentation," "sources of supply," "criticality" and "stability."

In comparing the two lists, the second analysis is very different from the first six attributes but appears

to be more applicable to Federal Government procurement - specifically DOD buys.

The three characteristics that did not apply from the first analysis were:

- "maintainability," which shouldn't affect how a company prices its product for DOD purchases. DOD does do a lot of its own maintenance and would not require much contractor support. If support is required, a separate maintenance agreement is more often employed. As a result, this characteristic should not be a large factor in the evaluation of a price.
- "homogeneity," of a DOD product is not applicable as most of DOD hardware acquisitions are still equipment specific and do not allow for substitutes.
- "consumption," seems to only affect fast moving items and not necessarily apply to large equipment buys conducted by the Government Contracting Officer.

4. Analysis

Wenger's classification scheme: (1) correlated the level of skill a buyer required for the procurement of a

product, and (2) identified which products could be segregated in order to combine the procurement efforts in the purchase of similar items. The result of Wenger's work assists the Contracting Officer in finding the buyer whose skills appropriately match the skills needed to procure particular items. He wanted to negate the effects associated with the "human factor" brought about by buyers dealing with items that were too complex for their abilities or in markets they weren't familiar with.

This researcher used Wenger's process to classify characteristics by their influence on the setting of prices. The results were seven characteristics that can be applied to a framework that allows the buyer to rate the likely impact a characteristic might have on commercial prices. While not giving the buyer the ability to determine if a price is fair and reasonable, it will point the buyer to areas in which to focus their research.

The resultant classification matrix of the researcher's taxonomical survey is shown in Figure 6. The breakout of the characteristics after the second analysis are shown in the figure as well.

In determining a fair and reasonable price for a commercial item, the Government Contracting Officer has several evaluation options. The focus of this chapter was on complex evaluations - evaluations of items associated with an industry where competition is limited or non-existent and information is not readily available.

FIGURE 6: TAXONOMICAL CLASSIFICATION OF PRICING FACTORS

<i>CHARACTERISTIC</i>	<i>IMPACT HIGH/MEDIUM/LOW</i>	<i>NOTES</i>
<i>COMPLEXITY</i>	HIGH	Rated High 7 out of 9 times.
<i>CUSTOMIZATION</i>	HIGH	Rated High 5 out of 9 times.
<i>UNIT COST</i>	MEDIUM	Rated Medium 7 out of 9 times.
<i>DOCUMENTATION</i>	MEDIUM	Rated Medium 5 out of 9 times
<i>SOURCES OF SUPPLY</i>	MEDIUM	Rated Medium 5 out of 9 times
<i>CRITICALITY</i>	MEDIUM	Rated Medium 6 out of 9 times
<i>STABILITY</i>	MEDIUM	Rated Medium 6 out of 9 times

[Figure developed by the researcher.]

These evaluations take more study and analysis to determine price reasonableness. An example of when a lack of information could make the procurement process "hard", as mentioned previously, could be in the purchase of a

car without being able to read the sticker price or being able to talk to the dealer / salesperson. One could talk to companies that provide similar models, companies that provide the parts, or review trade association publications in an attempt to cull the information required to make an educated estimate of the vehicle's worth. But is this enough information to determine if it is a quality product at a fair and reasonable price?

This example is analogous to the environment the Government Contracting Officer is in as the Federal Government moves toward commercial practices and the procurement of commercial items. Prior to FASA / FARA, the Government Contracting Officer could rely on certified cost or price data to aid in price reasonableness determinations in these "hard" situations. Now, as more of the items the Federal Government procures are commercial, the fewer times the Contracting Officer can rely on cost data to ensure a fair and reasonable price for the customer and ultimately the taxpayer. (Ref. 25)

In the current Federal procurement environment, to strictly adhere to the guidance of the FAR and CPRG when dealing with commercial item procurements can possibly

lead to an incomplete analysis. (Ref. 3) What the researcher believes important is for the Government Contracting Officer to "think out of the box" when it comes to finding ways to successfully determine if a proposed price is fair and reasonable. It is only in this manner, thinking outside of current structures and models, that today's Government Contracting Officer will be able to successfully operate in this post FASA and FARA environment to meet goals of procuring quality products at fair and reasonable prices.

D. SUMMARY

By introducing matrices, the observations of acquisition professionals and a review of the commercial perspective, this chapter has sought to explore some the challenges associated with determining a fair commercial price without the benefit of certified cost or pricing data. We reviewed the human factor of commercial price evaluation when the challenge of gathering the information necessary for a price evaluation appears to be daunting - will the buyer double his or her efforts or do the minimum to satisfy the job? We discussed the importance of market research and that training in market

research techniques needs to be emphasized. Finally, we followed the development of commercially applicable hybrid matrices, based on Wenger's taxonomical surveys, which emphasized different factors involved in the setting of product price.

Thus, the framework presented here sets the stage for the next chapter's development of four price evaluation matrices. Just as Chapter IV, through interviews and surveys, showed different ways to evaluate proposals, Chapter V will introduce these matrices in order to analyze factors outside traditional evaluation processes. Chapter V will present an analysis framework which allows the Government Contracting Officer to evaluate prices based on factors which do not require contact with the contractor, thus mitigating the lack of previously relied on cost or pricing information.

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V. A FRAMEWORK FOR ANALYZING COMMERCIAL PRICES

A. INTRODUCTION

Up to this point, various price determination methods have been discussed and evaluated, and factors thought to be important to price setting were presented as well. Chapter V takes from this research the premise that a price analysis framework could be designed that will enhance the ability of the Contracting Officer to determine a fair and reasonable price. Since the focus of this research is to evaluate prices offered for commercial items without the benefit of cost or price data or adequate price competition, the framework had to look at information external to what would, in the past, have been provided by the contractor. Specifically, the framework will evaluate how a contractor would potentially price an item.

Chapter IV showed that the factors industry used to determine its prices are varied and often dependent on external forces. Therefore, this framework will have to

be general enough to cover all known contingencies that affect price determination. The framework encompasses four matrices, called dimensions, each of which has four methods of analysis. Once the framework is explained, its dimensions and methods defined, a portion of the framework will be tested.

B. ANALYSIS FRAMEWORK

In order to determine what areas were the most appropriate to analyze and thus to use as the focus for the dimensions, basic accounting principles, used by most companies to track costs, led the researcher to the dimension titles. Even a college level accounting book covers in great detail how to account for the costs incurred by a company. Many costs are accumulated as a consequence of the manufacturing of products; therefore it is logical that an analysis of what these costs might be would lend itself to an understanding of a fair and reasonable price. As a result, the dimensions chosen are: Direct and Indirect Costs, Fixed and Variable Costs, Recurring and Non-Recurring Costs, and Asset Structure. Within each dimension are cost elements, which are categories directly associated with the dimension titles.

For example, the cost elements in the Direct and Indirect Cost Dimension are direct labor, direct material, overhead, G&A, Other Direct Costs, Profit, and Sales.

1. Dimension Matrix Titles

a) Direct and Indirect Costs

These are costs that are specifically traceable to or caused by production of a specific good (this analysis traces production of a product, but can also be applied to services). Two major direct costs are direct labor and direct materials. Indirect costs are costs that are associated with or caused by two or more operating activities but are not traceable to a particular good. The nature of an indirect cost is such that it is not possible to measure directly how much of the cost is attributable to a single operating activity. (Ref. 13, p. 301)

b) Fixed and Variable Costs

As the production cycle of an item varies, the resultant volume produced will change affecting the fixed and variable costs. Items of cost that vary directly and proportionally with the production quantity of a product are variable costs. Costs that are unchanged as volume

changes within the relevant range of activity are fixed costs. (Ref. 13, p. 301)

These costs include special tooling design, planning, set-up for production, advertising, cost of materials and direct labor wages.

c) Recurring and Non-recurring Costs

These production costs are generally incurred on a one-time basis and include plant or equipment relocation; plant rearrangement; special tooling and special test equipment; initial spoilage and rework, and salaries or contracted services. Recurring costs are production costs that vary with the quantity being produced, such as labor and materials. Non-recurring costs are those that occur a single time - only appearing at start-up, not during production. (Ref. 16, Part 17.103)

d) Asset Structure

Assets are economic resources that have the potential to provide future benefits to a firm. Assets are classified as current, which includes cash and assets expected to turn into cash within the year, and non-current, which are typically held for several years such

as land, buildings, and equipment. (Ref. 39, p. 10)

Validation of assets is measured on one of two bases:

(1) historical validation, which reflects the acquisition cost of assets or the amounts of funds originally obtained from owners, or (2) a current validation, which reflects the current cost of acquiring assets or the current market value of owner's claims on a firm. (Ref. 39, p. 11)

The elements included in this dimension include cash, accounts receivable, merchandise inventory, supplies inventory, land, buildings and equipment.

2. Methods

The choice of methods proved to be more challenging. Drawing upon the price analysis tools described in Chapter III, the methods chosen were those applicable and able to produce quantifiable results, could tie in with the definition of the dimensions and allow for the analysis of a wide range of procurements. The methods include: percentage, dollar buildup, CER, and market employment.

a) Percentage Method

Scodro and Newman describe the first step in the percentage method as developing a list of price elements

which was done in the form of the cost elements for each dimension. (Ref. 29, p. 24) Data regarding the price elements are extracted from various industry reports, the contractor's annual reports and their Securities and Exchange Commission (SEC) filings. The offered price is shown as 100%, representing the total of all the pricing elements. Therefore, as price element data are accumulated, that information is expressed as a percentage of the offered price.

Questions may arise as one studies the relative magnitude of the price elements and may possibly be resolved by comparing the percentages with the appropriate industry average. (Ref. 29, p. 22) The corporate profit element can also be verified by comparisons with industry average and the contractor's 10-K report.

Buyers using this method will use the data available and compare the reasonableness of the offer with patterns of industry and standard business practices. They formulate target prices on the basis of supplier information gleaned from publicly available supplier information, industry data and reasonable estimating ratios.

b) Dollar Build Up Method

In contrast to the percentage method that works from the offered (total) price or 100%, the dollar buildup method uses market research works down the cost elements to develop dollar amounts which are then added for a total price.

c) Cost Estimating Relationship (CER) Method

Also discussed previously was the use of parametric estimating measures and CERs. For this framework, CERs would have to be adapted to fit the differing cost elements. When the behavior is analyzed and a dollar figure developed these could be totaled for a price to be used in the comparison or dollar figures could be used to compare against industry calculated CERs.

d) Market Employment Method

The final method is one that evaluates a contractor's presence in the marketplace. Whereas market share refers to the percent of business a company holds in the marketplace, market employment refers to the percentage of a cost element (e.g. labor, material, cubic warehouse area) a corporate entity owns or has an

influence over when compared to the rest of the industry or local market. For example, if a shipbuilder employs a high percentage of steelworkers compared to the total steelworker workforce in the marketplace, the tendency would be to charge a higher labor rate to its customers. Conversely, if the shipbuilder owned a low market percentage of these workers, they would likely charge the buyer a lower price to stay competitive. In other words, this method looks at the contractor's involvement in a market from the buyer's perspective.

C. APPLICATION

Using the dimensions and methods presented, the researcher has compiled four analysis tables to assist a contracting officer in determining a fair and reasonable price.

By filling each table with data attributable to the different cost elements as determined by the four methods, the Contracting Officer is presented with an analysis framework that will not provide prices, but will show relative data points from which to gauge the contractors proposal.

The four tables are as follows:

TABLE 3: DIRECT AND INDIRECT COSTS DIMENSION

COST ELEMENTS	PERCENTAGE METHOD	DOLLAR BUILDUP METHOD	COST ESTIMATING RELATIONSHIP METHOD	MARKET EMPLOYMENT METHOD
DIRECT LABOR				
DIRECT MATERIAL				
OVERHEAD				
G & A				
ODC				
PROFIT				
SALES				
TOTAL				

[Table developed by researcher]

These four dimensions and their cost element relationship represent four possible approaches to analyze a contractor's proposal. Each may be used on their own but for the most complete analysis all dimensions should be used. Within each dimension there are four methods to assess pricing information. The data from each of these

TABLE 4: FIXED COST AND VARIABLE COST DIMENSION

COST ELEMENTS	PERCENTAGE METHOD	DOLLAR BUILDUP METHOD	COST ESTIMATING RELATIONSHIP METHOD	MARKET EMPLOYMENT METHOD
SPECIAL TOOLING DESIGN				
PLANNING				
SET-UP FOR PRODUCTION				
ADVERTISING				

R & D				
DIRECT LABOR WAGES				
COST OF MATERIALS				
TOTAL				

[Table developed by researcher]

**TABLE 5: RECURRING COSTS AND NON-RECURRING COSTS
DIMENSION**

COST ELEMENTS	PERCENTAGE METHOD	DOLLAR BUILDUP METHOD	COST ESTIMATING RELATIONSHIP METHOD	MARKET EMPLOYMENT METHOD
PLANT RELOCATION				
EQUIPMENT RELOCATION				
PLANT REARRANGEMENT				
SPECIAL TOOLING				
SPECIAL TEST EQUIPMENT				
SPOILAGE AND REWORK				
PILOT RUNS				
SPECIALIZED TRAINING				
LABOR				
MATERIAL				
OTHER BUSINESS EXPENSES				
TOTAL				

[Table developed by researcher]

TABLE 6: ASSET STRUCTURE

COST ELEMENTS	PERCENTAGE METHOD	DOLLAR BUILDUP METHOD	COST ESTIMATING RELATIONSHIP METHOD	MARKET EMPLOYMENT METHOD
CASH				
ACCOUNTS RECEIVABLE				
MERCHANDISE				

INVENTORY				
RAW MATERIAL INVENTORY				
SUPPLIES INVENTORY				
WIP INVENTORY				
FINISHED GOODS INVENTORY				
LAND				
BUILDINGS				
EQUIPMENT				
FURNITURE/ FIXTURES				
TOTAL				

[Table developed by researcher]

dimensions provide the Contracting Officer not only a basis for analysis, but also an analytical range on which to determine fair and reasonable price.

To assist the reader in how the dimensions function, the researcher has developed an example of one dimension that will prove the value of this framework.

The example is based on an actual contract from Naval Air Systems Command (NAVAIR) files. So as to protect the confidentiality of the contract, the contractor and item procured will be identified as a large aerospace contractor providing a part for the F-18 fighter jet aircraft. The contract price for the item was \$20,250.00 per unit.

1. Direct and Indirect Cost Dimension Analysis Example

In conducting this analysis, the researcher started with the percentage method. A study of the SEC filings and annual reports of the contractor manufacturing the aircraft item proved to be helpful. While this is a large contractor within a robust aerospace industry with industry reports, there was still a lack of information necessary to complete this method. Not every cost element was available for comparison which necessitated a modification to the framework. As previously explained, the percentage method starts by expressing net sales as 100% and the cost elements are expressed as percentages of net sales. Gathering data from the annual reports and using industry standards based on the National Industrial Supplier Code (NAISC) for the CDNU the researcher completed the table for the percentage method listing both contractor and industry results for comparison.

The results in Table 7 show that the contractor is generally inline with industry standards except for the higher profit percentage and the lower overhead percentage. For our analysis, the figures calculated for

the contractor would be used with the exception of an acceptable profit percentage of 8%.

TABLE 7: DIRECT AND INDIRECT/PERCENTAGE DIMENSION

COST ELEMENTS	PERCENTAGE METHOD/CONTRACTOR	PERCENTAGE METHOD/INDUSTRY
DIRECT LABOR	13.3%	13.7%
DIRECT MATERIAL	33.8%	34.7%
OVERHEAD	17.0%	24.7%
G&A	24.0%	20.0%
PROFIT	11.9%	6.9%
SALES	100%	100%

[Table developed by researcher]

In utilizing the dollar buildup method as another analysis of the procurement of the item, the Contracting Officer could use market research, secondary comparison techniques, and breakeven analysis to come up with dollar amounts for each cost element and then totaling them for an estimated unit price. For example, market research and comparison of similar items produced by contractors in the aerospace industry could be used to complete the fields in Table 8.

TABLE 8: DIRECT AND INDIRECT/DOLLAR BUILDUP DIMENSION

COST ELEMENTS	DOLLAR BUILDUP METHOD
DIRECT LABOR	\$2,699.90
DIRECT MATERIAL	\$6,861.40
OVERHEAD	\$3,451.00
G & A	\$4,872.00
PROFIT	\$2,415.70

TOTAL	\$20,300.00
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[Table developed by researcher]

Applying CERs to the analysis gives analytical expressions relating categories of cost to the cost elements. These can be informal rules of thumb or complicated functions calculated from statistical data. As with the percentage method, an estimate of CER reasonableness would require comparison with industry standards which, as previously stated, did not include all cost elements. Also, one has to realize the validity of the relationships being researched. Whereas, direct labor is commonly shown as \$/hr, other direct costs might not be a good measurement.

TABLE 9: DIRECT AND INDIRECT/CER DIMENSION

COST ELEMENTS	COST ESTIMATING RELATIONSHIP METHOD/CONTRACTOR	COST ESTIMATING RELATIONSHIP METHOD/INDUSTRY
DIRECT LABOR	\$ 21.00 / HR (\$591/unit)	\$ 20.31 / HR (\$572/unit)
DIRECT MATERIAL	\$ 7,907/ UNIT	\$ 7,605/ UNIT
OVERHEAD	\$ 3,830/ UNIT	\$ 5,557/ UNIT
G & A	\$ 6,000/ UNIT	\$ 4,500/ UNIT
PROFIT	\$ 2,677/ UNIT	\$ 1,552/ UNIT

[Table developed by researcher]

The contractor proves to be competitive with industry CERs, therefore it is reasonable to use the contractor CER's in Table 9.

Finally, market employment requires the analysis of the company's "presence" in the market or as mentioned before, its influence on the prices or costs of cost elements. The same dilemma is encountered in Table 10 as with the percentage and CER methods in that not all cost elements are functionally appropriate. Only Direct Labor and Direct Material relate to this method in this dimension. For the example, procurement of the item, focus was on a metropolitan area in which the company is located. Research of the industry in general (Computer and Electronic) and NAISC code (Search and Navigation Equipment), in particular, show that while there are ten corporate entities in the industry only one manufactures the item. And while approximately 17,000 employees work in the industry only 6,000 are listed under the NAISC code for our item. Initially, the contractor seems to have a good hold on the market employment for the item, but it is logical that the skill set is easily transferable between the ten other establishments and the 11,000 other employees. Thus, the Contracting Officer could expect higher than average wages in order to retain quality employees. Likewise, with regard to Direct Material costs, prices could be high with such a

competitive market (considering the ten Computer and Electronic establishments use many of the same components used for the items), or low if materials were purchased in bulk. For this example, the researcher assumed good competition for materials and above average prices.

TABLE 10: INDIRECT AND INDIRECT/MARKET EMPLOYMENT DIMENSION

COST ELEMENTS	MARKET EMPLOYMENT METHOD
DIRECT LABOR	Above average wages
DIRECT MATERIAL	Above average Prices

[Table developed by researcher]

2. Analysis of the Direct and Indirect Cost Dimension Example

By utilizing the results of the methods and incorporating them into the framework (Table 11), the Contracting Officer has a comprehensive method of determining price reasonableness.

TABLE 11: DIRECT AND INDIRECT COST DIMENSION EXAMPLE

COST ELEMENTS	PERCENTAGE METHOD	DOLLAR BUILDUP METHOD	COST ESTIMATING RELATIONSHIP METHOD	MARKET EMPLOYMENT METHOD
DIRECT LABOR	13.3%	\$2699.90	\$ \$591/unit	Above average wages
DIRECT	33.8%	6861.40	\$ 7,907/ unit	Above

MATERIAL				average prices
OVERHEAD	17.0%	3451.00	\$ 3,830/ unit	
G & A	24.0%	4872.00	\$ 6,000/ unit	
PROFIT	8.0%	2415.70	\$ 2,677/ unit	
TOTAL	100%	\$20300.00	\$21005.00	

[Table developed by researcher]

As mentioned previously, the completed dimension gives the Contracting Officer not only a projected unit price but also reference data points. For this example, the Contracting Officer could make a determination that the offered price for the items is fair and reasonable as the dollar buildup and CER methods give prices close to the actual contract unit price of \$20,250.00/unit for the items. However, the results of percentage and market employment methods quantify factors that are not readily translated into dollar figures and can potentially be used to formulate a negotiating position.

D. CONCLUSION

While useful for guiding the contracting officer through a myriad of potential price determination procedures and laying the results out in one of four dimension frameworks, the practicality of the framework is difficult to gauge. The framework has limited utility

if the contractor being researched is a small or wholly owned proprietorship in that it would not be listed with the SEC nor produce annual reports. Without this information, the percentage method would not work. Likewise, if the product being procured is not part of a robust industry, valid comparisons between contractor and industry could not be performed. Conversely, an industry that is too large would most likely produce more than one contractor thus negating the use for this framework.

As with this example, it is necessary that the framework be flexible enough to match the information available. Contracting Officers would have to manipulate the framework in order to produce the comparisons necessary for the price determination.

The Framework for Analyzing Commercial Prices presented herein provides a roadmap to guide Contracting Officers through somewhat uncharted waters as the new era of reliance on commercial practices continues to unfold. Data, while available, may be difficult to obtain, and until procurement databases are more widely shared and populated, it is likely thought the results will be partially complete matrices. In addition, as the researcher illustrated, missing data will have to be

extrapolated. Although completing the framework may, at times, be challenging, it does provide a comprehensive tool to assist Contracting Officer's in the development of their negotiation positions.

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VI. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

As discussed in Chapter I, the purpose of this thesis was two fold: 1) to examine factors a contractor could apply to determine the price it charges the Government for a good or service, and 2) provide a framework to aid Government Contracting Officers in determining a fair and reasonable price. During the exploration of these purposes, literature research, personal interviews and surveys with contracting professionals it became apparent as to the unique challenges Government Contracting Officers face when executing commercial item procurement.

From FASA and FARA to current acquisition reform initiatives, DOD's desire to encourage more industry involvement in the procurement process and to procure more commercial items has been at the forefront of change to the Government contracting environment as stated in Chapter II. This thesis specifically focused on offers exempted from the submission of certified cost or pricing

data, and how to best evaluate their prices. Continued scrutiny from auditors has tempered this drive to “commercialize” Government acquisition with greater concern as to how taxpayer’s funds are expended. Chapter III showed that the Federal Acquisition Regulation (FAR) guidance provides basic price analysis steps, but it is still left up to the Government Contracting Officer to collect and analyze the data and make the final determination of a fair and reasonable price.

Because a commercial item is exempt from the submission of certified cost or pricing data, the Government Contracting Officer has to be able to gather and analyze other pertinent information to make a determination of price reasonableness. Information other than traditional cost and pricing data has to be considered, contractors’ price setting factors need to be examined, and new ways to analyze data have to be introduced.

An analysis of an offered price without the benefit of certified cost or pricing data could be challenging. First, some insight into how a contractor might decide a selling price needed to be discussed. Chapter III examined how an understanding of pricing theories could

assist the Government Contracting Officer in the analysis of an offered price. Whether to rely on market data assuming that the contractor set prices based on the Market or the Transactional Cost Economics theory, or to research the contractor's public data, and attempt to mitigate a "Game or Bargaining Theory" strategy is crucial to which analytical technique(s) a Contracting Officer might use. Regardless of the technique, however, a substantial amount of data are still required, and the Contracting Officer is responsible for a determination that could rely on judgment more than the detailed quantitative results of established techniques.

In order to examine actual price analysis practices, Chapter IV examined surveys and interviews with industry and Government procurement officials for specific methods and factors considered. Chapter IV also narrowed the definition of what was being researched: complex evaluations where competition was limited or non-existent and information was not readily available. Surveys and interviews further highlighted difficulties encountered with data collection. Evaluations meeting this definition require a complete analysis oftentimes forcing the Contracting Officer to come up with types of

evaluation solutions like those explored in this thesis. One method was to incorporate a taxonomical matrix emphasizing the different factors that could be involved in setting a product price. Using the matrix allowed the Contracting Officer to collect and sort data for analysis based on the relative importance of those factors to the setting of selling prices - a qualitative analysis at best.

Still remaining was the question of how to evaluate an offer using only data gathered from sources other than the contractor. All previous discussions of evaluation methods required some sort of interaction with the contractor, but what if the contractor did not or will not provide data?

Chapter V sought to overcome this challenge by presenting methods that would use information available from sources other than the contractor. The groundwork for discussion had been laid in Chapters III and IV, which proposed the utility of evaluations using data from sources other than the contractor. Pricing theories and the taxonomical matrix of pricing factors led to Chapter V's presentation of a framework of four dimensions that do not rely on contractor input for results. The

usefulness of these dimensions was tested with a sample solicitation demonstrating that if the framework is flexible, it can have applicability. Gathering information for price analysis can be a cumbersome exercise regardless of the evaluation method employed, but when the information is not used in a method defined in the FAR, the system of dimensions described allow for an organized juxtaposition of these varied data which is important for a commercial item procurement.

B. CONCLUSIONS

The following are eight conclusions drawn from a review of this thesis.

1. Many Government Contracting Officers have not developed the skills to apply the tools to evaluate commercial prices for a fair and reasonable price determination.

Chapter II discussed that while industry has always used commercial evaluation methods, the Government Contracting Officer had evaluated prices by what many considered restrictive procedures – including the reliance on certified cost or pricing data. New regulations facilitated the use of reform-minded

evaluation methods, but these regulations were instituted, not to make the evaluation easier on the Contracting Officer, but rather, among other things, to entice industry to increasingly participate in the Government acquisition process. Thus, Contracting Officers found themselves looking for tools and interpreting results that were originally adapted for commercial evaluations with minimal success. Not only were Contracting Officers trying to work processes tailored for industry, but also they lacked the opportunity to actively employ or test new evaluation methods. This was evident when this researcher was challenged to find a large commercial item procurement to use as an example in Chapter V. Additionally, the infrequency of large commercial item procurements certainly does not provide a substantive base to build upon for lessons learned.

2. The pricing theories of Market, Transactional Cost

Economics (TCE) and Bargaining are useful parameters for evaluating commercial prices.

These theories, as discussed in Chapter III, offer the Contracting Officer a unique perspective on how

industry sets their prices. In understanding the theories, the Contracting Officer can decide whether to employ a particular price analysis technique or use the framework developed by this researcher. Market and TCE theories rely on market conditions while the Bargaining theory minimizes the effect of market forces to set prices. A contractor would use the Bargaining theory if they set prices to undercut competitor prices or anticipated effects of several external and internal variables. Regardless of which theory is used, substantial amounts of data are required in order to make a fair and reasonable price determination. The quality and source of these data collected from the contractor, or from means external to the contractor, are essential in the decision of whether or not to use the framework proposed in Chapter V.

3. The factors of complexity and customization appear to have the greatest impact on commercial item pricing.

Using a taxonomical approach, this researcher surveyed industry to ascertain the factors that would have the most impact on the pricing of their products. It was believed, while not giving the Contracting Officer

a decisive determination, these characteristics could point the buyer to areas on which to focus their evaluation research. Of the 12 taxonomical characteristics that impact industry, complexity and customization were determined to have the most influence on pricing decisions based on survey responses. Five characteristics - unit cost, documentation, sources of supply, criticality and stability - have only a medium impact on commercial item pricing. Change, maintainability, homogeneity, consumption and item attention have low or no impact on pricing. As a Contracting Officer conducts evaluations without the benefit of certified cost or pricing data, the ability to direct time and effort to these specific areas of research could be beneficial.

4. Price evaluation using competition, historical data, in-house estimates, supplier benchmarking, and reverse engineering still tend to be active and legitimate methods.

The interviews and surveys, analyzed in Chapter IV, asked for current evaluation methods from both commercial and Government Contracting Officers. While price determination using a competitive market was the

preferred method; historical data, in-house estimates, supplier benchmarking, and reverse engineering were the processes used most often when there was not true competition. Contracting Officers with inherent evaluation resources and capabilities could readily utilize historical data and in-house estimates while supplier benchmarking could be used by those lacking these assets. Reverse engineering was mentioned as a method that could provide alternative cost effective solutions and/or a second source for competition.

5. Traditional price evaluation methods of breakeven point analysis, parametric cost estimating, rough yardsticks, and Independent Cost Analysis (ICA) are not being widely used by Contracting Officers.

The interviews and surveys from Chapter IV failed to mention some of the more commonly available price evaluation tools that include breakeven point analysis, parametric cost estimating, rough yardsticks, and ICA. This researcher deduced that these methods might not be fully understood by the acquisition workforce or the current evaluations are not within the parameters required to use these methods.

6. The Wenger taxonomical study is a useful model for developing and analyzing key factors in price evaluation.

Wenger's taxonomical classification of goods was discussed in depth in Chapter IV. Using six characteristics, Wenger studied how the relationship between his set of characteristics could be correlated with the goods procured by the Government with that of a buyer's capability. Wenger's establishment of this relationship led this researcher to conclude that these characteristics might also have an affect on the setting of prices. The commercial pricing survey in Chapter IV revealed to this researcher seven factors (presented in figure 6) that can be applied to a framework that allows a Contracting Officer to rate the likely impact a characteristic might have on commercial prices and point to areas in which to focus their evaluation research.

7. The effectiveness of the framework methods (percentage, dollar buildup, CER, market employment) tend to be tied to a contractor's business size or status.

The analysis of the framework example completed in Chapter V showed how two of the four methods relied on industry information and financial data for calculations

and comparison. The percentage and Cost Estimating Relationship (CER) methods used data gathered from company annual reports and industry standards based on the National Industrial Supplier Code (NAISC) for the item being procured. When a contractor is evaluated, the juxtaposition of contractor and industry results can be used to: 1) gauge the accuracy of the contractor numbers, and 2) allow for a determination of whether a contractor's offer is fair and reasonable. Using industry data for comparison, the percentage and CER methods proved to be the most accurate. These methods might not be as effective with small and/or privately held companies, however, as there would be no data available neither from the Securities and Exchange Commission (SEC) nor from annual reports. In contrast, the market employment method requires the most assumptions and reliance on Contracting Officer judgment. As a result, this method could prove to be the most inaccurate of the four used in the framework. The dollar build up method was found to be neither more effective nor less effective according to the status of the contractor.

8. The price analysis techniques anchor all evaluation processes and can never be substituted for any other approach.

In Chapter III, it was stated that price analysis always involves some form of comparison with other prices and is generally used in all procurements. Not only is price analysis used to evaluate prices in low dollar contracts or those awards based on adequate price competition, but on large dollar, sole source procurements of weapon systems that use cost analysis as well. As acquisition reform mandates the removal of the many barriers commercial firms encounter when trying to participate in Government acquisitions such as certified cost or pricing data, the use of price analysis becomes paramount. As new price evaluation methods are developed and introduced they should be categorized as one of the four price comparison techniques - primary, secondary, auxiliary, and other.

C. RECOMMENDATIONS

Below are recommendations that address various aspects of commercial price evaluation that have been examined throughout this thesis.

1. The framework developed by the researcher could be applied as a tool in Price-Based Acquisitions (PBA).

PBA is essentially making purchases without relying on the supplier's cost information, which is the premise of this thesis. The requirement, however, for a fair and reasonable price determination still exists, and as discussed herein, Contracting Officers have minimal tools that effectively analyze offers without obtaining supplier cost data. Further study is needed to fine-tune the framework but once this is completed, the framework in Chapter V should be presented to numerous procurement associations and possibly the Defense Acquisition Reform Task Force for dissemination and integration into the acquisition community.

2. Evaluations of complex procurements should focus on how certain characteristics or factors impact the price of commercial items.

Evaluations of items when competition is limited or non-existent, and when information is not readily available, require more study and analysis to determine price reasonableness. Therefore, an evaluation process looking at characteristics that affect pricing should be mandatory. Seven characteristics according to this

researcher determined to have the most impact on commercial pricing are: complexity, customization, unit cost, documentation, sources of supply, criticality, and stability. Ideally, the evaluation of such items could be performed with emphasis placed on complexity and customization, which received the highest impact ratings, and additional review of the other characteristics of lesser impact.

3. The framework presented herein by the researcher should be tailored by the Contracting Officer for maximum effectiveness.

The framework has limited utility if the contractor being researched is not publicly listed with the SEC, or does not produce annual reports. Likewise, if the product being procured is not part of a robust industry, comparisons between contractor and industry are more difficult to perform. In both instances, the effectiveness of the framework is decreased as not all the methods could be utilized without this information. To maximize its use, an expanded list of cost elements and methods needs to be developed that Contracting Officers could easily manipulate to match information

available and produce comparisons necessary for a reasonable price determination.

4. The acquisition workforce should develop a comprehensive understanding of various theoretical tools including the Market, TCE and Bargaining theories as they apply to pricing considerations.

Contracting Officers should be prepared for new methods of price evaluation, and be aware of theories considered by contractors when setting prices. New employees into the acquisition community are inundated with training courses that are continuously updated with the latest FAR changes and advances in procurement policies. Senior procurement officials, however, are left to their own devices to keep abreast of acquisition reform. In understanding the concepts and theories behind price setting and price evaluation, the Contracting Officer can decide on which price comparison technique to use, or if a new approach, such as the framework developed by this researcher, is appropriate.

5. Contracting Officers should experiment with the application of the matrix provided in Table 12.

As a summary table of the framework proposed by the researcher, this matrix could include results calculated

previously. Use of the table could enable a Contracting Officer who has tailored the framework to meet certain evaluation parameters to have a comprehensive view of all of the methods when developing a fair and reasonable price determination.

TABLE 12: DIMENSION / METHOD SUMMARY TABLE

		METHODS			
		Percentage Method	Dollar Build Up Method	Cost Estimating Relationship Method	Market Employment Method
DIMENSIONS	Direct and Indirect Costs				
	Fixed and Variable Costs				
	Recurring and Non-recurring Costs				
	Asset Structure				

[Table developed by researcher]

D. ANSWERS TO RESEARCH QUESTIONS

- **What are the principal factors in commercial pricing for Department of Defense products and services and how might the Government's ability to analyze pricing be improved?**

A contractor's ability to evaluate the market and/or industry plays heavily on that contractor's pricing strategy for DOD products and services. A commercial firm will analyze the market to determine a product saturation point. It will also look at its "standing" in the market sector. The taxonomical survey in Chapter IV showed seven factors contractors thought to be important to pricing.

To improve on the Government's ability to analyze pricing requires knowledge of what factors a commercial firm might use to price their products. In doing so, evaluation techniques can be tailored to identify the same factors a contractor would use to determine their proposed price. The framework developed by the researcher, presented in Chapter V, incorporates many of these price setting factors into dimensions that, when completed and combined together, can give Government Contracting Officers dollar figures and relational points

that can be used to establish a fair and reasonable price.

- **What is commercial pricing?**

Commercial pricing is the process by which a contractor determines the selling price of an item. The process is more than likely based on one of the three pricing theories – Market, Transactional Costs Economics, Gaming or Bargaining.

- **What are market data?**

Market data are industry and product information that affects how a company operates. This includes industry standards, market conditions (labor supply, international situation, cyclical timing), the study of SEC filings and annual reports, and supplier information.

- **What are the essential elements considered by industry in developing commercial price bids and proposals?**

While not necessarily an element, market research was considered paramount to the setting of commercial price bids and proposals. External factors included market conditions, industry competition, competitor's workload, and internal factors included cost of sales, desired profit, contingencies and in-house workload.

- **What challenges have arisen as a result of the Federal Government's move toward commercial pricing?**

The advent of commercial pricing has primarily affected Government Contracting Officers in the way they evaluate commercial item proposals. The responsibility for determining a fair and reasonable price is still a primary duty of the Contracting Officer but the tools used to make that determination have changed. In the past, certified cost or pricing data were relied upon for a cost analysis decision. In some cases, this detailed information could even provide the Contracting Officer with evidence of a contractor in violation of TINA for faulty data submission. Now, however, the responsibility for an accurate determination falls solely on the Government Contracting Officer, and contractor culpability has been diminished.

- **What is the Government's perception of the commercial pricing process?**

Most procurement officials interviewed for this thesis were cautiously optimistic of the benefits resulting from the commercial pricing process since FARA and FASA. They believed that as time passes Government Contracting Officers will take advantage of price

evaluation lessons learned to become better trained and knowledgeable in commercial pricing practices. Most conceded that Contracting Officers needed to be better equipped with new evaluation processes similar to what was being proposed in this thesis.

- **How might the Department of Defense acquisition workforce improve its ability to analyze and negotiate commercial prices?**

Government Contracting Officers must continue to learn more about how their commercial counterparts not only set prices, but how they evaluate the proposals they receive. In developing a list of commercial price setting factors, this thesis has formulated a price evaluation framework capable of giving the Government Contracting Officer a tool for calculating dollar figures and relative reference points to establish a fair and reasonable price determination.

E. AREAS FOR FURTHER STUDY

During this study, the researcher found several areas that warrant further research. These areas are presented as a research question followed by a short discussion.

1. How can the framework developed by the researcher be improved?

Chapter V discussed the challenges that might be encountered when the framework is implemented. They are primarily associated with contractor size, and how to incorporate the framework data into a sound analysis. Research is needed to edit the cost factors and/or methods to accurately capture data on smaller contractors, and provide more definitive formula processes to calculate the dimension results.

Framework results rely heavily on the ability of the Contracting Officer to use information gathered from SEC filings and annual reports, which are difficult to obtain from smaller contractors. A study is needed to examine how these smaller contractors track their financial accounts. Smaller firms might set their prices differently than that of the large traditional DOD contractors surveyed for this paper. Findings would enable the researcher to modify dimension cost factors or methods.

Further research is needed to develop standard processes/formulas for method calculations. Chapter V acknowledged the need for the framework to be flexible as

differing contractors and item requirements define different approaches for analysis evaluation. This being said, in defining the formulas the Contracting Officer has a starting point from which to work and could modify the dimension accordingly.

2. What is the affect of framework analysis on a commercial firms price setting processes?

An argument can be made that commercial firms might adjust their pricing methods as Government acquisition professionals adjust price evaluation processes. A study is needed to determine how dynamic industry pricing processes are in light of a changing evaluation environment.

3. What are the implications of Contracting Officers' use of the Internet as a sole vehicle for market research?

The Internet is a common tool for market research and may even be the sole means of acquiring SEC filings, annual reports, as well as industry information. A study is needed to assess how effective this use of internet information is, and if the use of the internet as a sole means of market research may limit the Contracting Officer in their search for applicable data.

APPENDIX A

INDUSTRY SURVEY FORM

DATE: _____

NAME OF PERSON BEING INTERVIEWED:

POSITION (TITLE): _____

1. When purchasing supplies (capital equipment) or services how do you evaluate the proposals? How do you determine if the price proposed is fair? What are the pricing factors you would use to evaluate a proposal?
2. What factors are involved in your determination of a selling price? What industry factors affect your selling price?
3. Do you conduct market research? How do you use the information gathered to determine fair purchasing process?

4. How do you evaluate competitive bids? What is a competitive market?
5. How do you evaluate sole source procurements from suppliers who you do not have partnering relationships?
6. Do you use industry standards/data for evaluation?
7. Do you use the annual shareholders reports or SEC 10-K/10-Q reports influence how you perceive suppliers or how would you evaluate proposals?

APPENDIX B

GOVERNMENT INTERVIEW FORM

DATE: _____

NAME OF PERSON BEING INTERVIEWED:

POSITION (TITLE): _____

1. What are the current practices used in preparing a negotiation position if cost or pricing data are not available?
2. How do you analyze proposal prices without the benefit of cost or pricing data or any info fm the contractor?
3. How have these procedures changed in the last few years?
4. What examples of problems could you provide that have arisen as a result of federal government move toward commercial pricing?

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APPENDIX C

WENGER'S CHARACTERISTIC DEFINITIONS

1. Complexity describes the good's technical complexity and rate of technological change. Technical obsolescence along with a high degree of complexity become major factors in considering a good and the methodology employed in purchasing the good.
2. Maintainability refers to the amount and degree of maintenance and logistic considerations associated with the good. The amount and degree of each vary widely among the different types of goods.
3. Customization is the degree to which the good is manufactured to the buyer's unique specification. Some goods, those that are strictly commercial, have no amount of customization while others are produced exclusively for a buyer, e.g. the Government.
4. Homogeneity represents the number of goods that are similar and are ready substitutes for one another. Typically the more common the use of the good, the greater the amount of homogeneity.
5. Unit cost is the good's cost to the buyer. Generally speaking, as a good becomes more unique to the buyer's requirement(s), the unit cost increases.
6. Consumption refers to how rapidly the good is used by the buyer. Some goods are consumed on a continuing basis and require constant replenishment. Others are of a more permanent nature resulting in much less frequent buying.
7. Specifications represent the type of requirement the Government imposes on the seller to conform with the various types of specification requirements. Whether it is a design, performance or functional specification, the absence or presence varies across the spectrum of goods the Government buys.

8. Documentation is another characteristic external to the good yet many times a necessary part of it. Frequently the Government requires substantiating documentation in the form of drawings, technical manuals, and certifications for some types of goods while for others little at all is required.
9. Item attention given by the buyer refers to single-item versus volume or mass buying. When a buyer deals with small dollar-value item like common bolts and rivets, the focus is on mass quantity of these types of goods. Contrast this with the acquisition of an F-14 aircraft where the buyer's attention is focused on a single item.
10. Criticality represents the buying urgency associated with the good or the essentiality of having the good available for the buyer to purchase. This characteristic of a good is quite obviously dynamic and will depend on the situation in which the buy is being made.
11. Stability refers to the nature of the requirement. Some goods are stable in their requirements and design. Their supply will vary little given that their end-use rate doesn't change. Other requirements change quickly and often depending on the need situation and state-of-the-art technology.
12. Sources of supply refer to the number of available companies that provide the same basic type of good. Some types of goods have associated with them a great number of alternate sources while others of a more specialized nature are more restrictive.

APPENDIX D

WENGER'S CHARACTERISTICS AND SCALES

1. Complexity

SCALE:

- 1 Very low technical complexity
- 2 Low technical complexity
- 3 Medium technical complexity
- 4 High technical complexity
- 5 Very high technical complexity

2. Maintainability

SCALE:

- 1 No maintenance considerations
- 2 Low maintenance considerations
- 3 Medium maintenance considerations
- 4 High maintenance considerations
- 5 Very high maintenance considerations

3. Customization

SCALE:

- 1 No amount of customization
- 2 Low degree of customization
- 3 Medium amount of customization
- 4 High amount of customization
- 5 Very high amount of customization

4. Unit cost

SCALE:

- 1 Very low unit cost
- 2 Low unit cost
- 3 Medium unit cost
- 4 High unit cost
- 5 Very high unit cost

5. Homogeneity

- 1 Very high homogeneity
- 2 Low homogeneity
- 3 Medium homogeneity
- 4 High homogeneity

- 5 Very high homogeneity
6. Consumption
SCALE:
- 1 Very rapidly consumed good, constant replenishment
 - 2 Rapidly consumed good, constant replenishment
 - 3 Moderate consumption and replenishment
 - 4 Low rate of consumption and replenishment
 - 5 Very low rate of consumption and replenishment
7. Specifications
SCALE:
- 1 Completely commercial item with no specifications
 - 2 Mostly commercial but some accompanying requirements
 - 3 Moderate amount of specification requirements
 - 4 High amount of specification requirements
 - 5 Very amount of specification requirements
8. Documentation
SCALE:
- 1 No associated documentation
 - 2 Low amount of documentation
 - 3 Medium amount of documentation
 - 4 High amount of documentation
 - 5 Very high amount of documentation
9. Item Attention
SCALE:
- 1 Complete volume-type attention
 - 2 Mostly volume-type attention
 - 3 Good that could be either volume or single item
 - 4 Good that is usually single-item attention
 - 5 Good that is always single-item attention
10. Sources of Supply
SCALE:
- 1 Virtually unlimited number of suppliers
 - 2 High number of suppliers
 - 3 Adequate number of suppliers
 - 4 One or two sources
 - 5 No sources exist

11. Criticality

SCALE:

- 1 Never characterized as a critical item
- 2 Rarely a critical item
- 3 Sometimes approached as critical
- 4 Usually characterized as critical
- 5 Always purchased under critical situations

12. Stability

SCALE:

- 1 Good that is extremely stable
- 2 High degree of stability
- 3 Moderate amount of stability
- 4 Low amount of stability
- 5 Highly unstable good

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APPENDIX E

SURVEY NUMBER TWO

In order to establish a framework of elements important to pricing of items sold (pricing function) and bought (procurement function), it is imperative to determine a baseline set of factors. The following list of characteristics is pulled from a Naval Postgraduate School thesis by Brian Wenger (1990). He set out to develop a scheme that Government contracting personnel could use in classifying goods along a continuum from simple to complex. Mr. Wenger determined that these characteristics were the most applicable for his study because of their significance in describing goods purchased by the Government.

For our research, however, we are using this list to determine the impact these characteristics have on the pricing of goods that are sold by a firm. To do this, we are requesting that you pick five items (use the same five products throughout survey) that your company produces and evaluate the impact each characteristic has on the pricing of that item. Please indicate the level of impact that each characteristic has on the five products by placing the corresponding letter next to the product where "H" = HIGH, "M" = MEDIUM, "L" = LOW. Thank you.

First, three questions:

(1) How does your firm define a "commercial item"?

(2) And how does your firm perceive that the Government defines "commercial item"?

(3) Does your firm have separate procurement and pricing organizations? Why? Who in your firm has pricing decision authority?

CHANGE describes the good's rate of technological transformation. With some goods, their rate of technological change is very low. Their design is fixed and rarely, if ever changes. Contrast this with those goods that are affected by state-of-the-art technology and are characterized by a high rate of technological obsolescence.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

COMPLEXITY describes the good's technical intricacies. The degree of a good's technical complexity may be thought of in terms of the skill and expertise needed to produce the good. Another way to determine complexity is whether the good is a system, sub-assembly, component, piece part, or raw material.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

CUSTOMIZATION is the degree to which the good is manufactured to the buyer's specifications. Some goods, those that are strictly commercial, have no amount of customization while others are produced exclusively for a buyer, e.g. the Government.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)

- (4)
- (5)

MAINTAINABILITY refers to the amount of maintenance considerations associated with the good. In other words, how frequently, if at all, is maintenance required on the good. Some goods are virtually maintenance-free while others require a great deal of maintenance throughout their lives.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

HOMOGENEITY represents the number of other goods that are similar and are ready substitutes for the good under consideration. Typically, the more common the use of the good, the greater the amount of homogeneity.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

CONSUMPTION refers to how rapidly the good is used by the buyer. Some goods are consumed on a continuing basis and require constant replenishment. Others are of a more permanent nature resulting in much less frequent buying.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

UNIT COST is the good's cost to the buyer. Generally speaking, as a good becomes more unique to the buyer's requirement, the unit value is increasing.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

DOCUMENTATION is another characteristic external to the good yet many times a necessary part of it. Frequently the Government requires substantiating documentation in the form of drawings, technical manuals, and certifications for some types of goods while for others little at all is required.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

ITEM ATTENTION given by the buyer refers to single-item versus volume or mass buying. When a buyer deals with small dollar-value items like common bolts and rivets, the focus is on a mass quantity of these types of goods. Contrast this with the acquisition of a F-14 aircraft where the buyer's attention is focused on a single item.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

SOURCES OF SUPPLY refers to the number of available sources that provide the same basic type of good. Some types of goods have associated with them a great number of alternate sources while others of a more specialized nature are more restrictive.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)

- (3)
- (4)
- (5)

CRITICALITY refers to the buying urgency associated with the good or the necessity of having the good available for the buyer to purchase. This characteristic of a good can be quite dynamic, but some goods, by their nature, may rarely be characterized as critical to the buyer.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

STABILITY refers to the nature of the requirement. With some goods their demand is constant and seldom varies. On the other hand, demand for certain types of goods is much more volatile and uncertain depending on the need for the good and perhaps the technology that is available.

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

CHARACTERISTIC NOT LISTED? _____

PRODUCT/IMPACT (HIGH, MEDIUM, LOW):

- (1)
- (2)
- (3)
- (4)
- (5)

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APPENDIX F

SURVEY RESULTS

COMPANY: A – AEROSPACE INDUSTRY

CHARACTERISTIC S			PRODUC T NUMBER			RESULT S H/M/L
	1	2	3	4	5	
CHANGE	M	H	L	L	L	1/1/3
COMPLEXITY	H	H	H	H	M	4/1/0
CUSTOMIZATION	H	L	M	H	M	2/2/1
MAINTAINABILIT Y	M	H	H	H	M	3/2/0
HOMOGENEITY	H	L	M	L	M	1/2/2
CONSUMPTION	H	M	M	M	H	2/3/0
UNIT COST	H	M	M	M	M	1/4/0
DOCUMENTATION	H	H	H	H	M	4/1/0
ITEM ATTENTION	M	H	H	H	M	3/2/0
SOURCES OF SUPPLY	H	M	H	H	L	3/1/1
CRITICALITY	H	M	M	M	M	1/4/0
STABILITY	H	L	M	M	M	1/3/1

COMPANY: B – PETROLEUM INDUSTRY

CHARACTERISTIC S			PRODUC T NUMBER			RESULT S H/M/L
	1	2	3	4	5	
CHANGE	M	M	M	-	-	0/3/0
COMPLEXITY	M	H	M	-	-	2/1/0
CUSTOMIZATION	H	H	H	-	-	3/0/0
MAINTAINABILIT Y	L	L	L	-	-	0/0/3
HOMOGENEITY	H	L	H	-	-	2/0/1
CONSUMPTION	H	H	M	-	-	2/1/0
UNIT COST	M	M	M	-	-	0/3/0
DOCUMENTATION	M	M	M	-	-	0/3/0

ITEM ATTENTION	L	L	L	-	-	0/0/3
SOURCES OF SUPPLY	M	M	M	-	-	0/3/0
CRITICALITY	H	L	M	-	-	1/1/1
STABILITY	M	L	M	-	-	0/2/1

COMPANY: C – AVIONICS AND COMMUNICATIONS COMPANY

CHARACTERISTICS			PRODUCT NUMBER			RESULTS H/M/L
	1	2	3	4	5	
CHANGE	H	-	-	-	-	1/0/0
COMPLEXITY	H	-	-	-	-	1/0/0
CUSTOMIZATION	M	-	-	-	-	0/1/0
MAINTAINABILITY	H	-	-	-	-	1/0/0
HOMOGENEITY	H	-	-	-	-	1/0/0
CONSUMPTION	L	-	-	-	-	0/0/1
UNIT COST	H	-	-	-	-	1/0/0
DOCUMENTATION	M	-	-	-	-	0/1/0
ITEM ATTENTION	M	-	-	-	-	0/1/0
SOURCES OF SUPPLY	M	-	-	-	-	0/1/0
CRITICALITY	M	-	-	-	-	0/1/0
STABILITY	M	-	-	-	-	0/1/0

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